AMERICAN METEOROLOGICAL SOCIETY

R
016.5515
A512m

# meteorological

# abstracts and bibliography

Illinois U Library

liography on Climate of Paraguay, Uruguay, and Argentina, p. 243

l. 3 March, 1952 No. 3

# METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

*Editor and Technical Supervisor:* MALCOLM RIGBY

*Corresponding Editor:* DR. C. E. P. BROOKS

EDITORIAL STAFF

ISADORE L. DORDICK, *Analyst*
WILHELM NUPEN, *Analyst*
MARY L. RICE, *Assistant Editor-Bibliographer*
HARRIS P. KRAMER, *Bibliographer-Analyst*
MOLLIE P. KRAMER, *Bibliographer*
GEZA T. THURONYI, *Bibliographer*
WINIFRED SCHRAITLE, *Cataloguer*
DOROTHY M. GROPP, *Cataloguer*
KATHERINE MARTINOFF, *Technical Editor*

***EDITORIAL OFFICE:** Washington, D. C. **P.O. ADDRESS:** Box 1736, Washington 13, D. C. Telephone: REpublic 6278.

**ADMINISTRATIVE OFFICE: American Meteorological Society,** Office of Executive Secretary, 3 Joy Street, Boston 8, Mass.

*** Address all business communications, orders and inquiries to the Executive Secretary, Mr. Kenneth C. Spengler, 3 Joy Street, Boston 8, Mass. Exchanges and reprints may be sent direct to P. O. Box 1736, Washington 13, D. C.**

**METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY** is a monthly publication devoted to:

A. Current Abstracts in English on important meteorological literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

**SUBSCRIPTION RATE:** $6.00 per year to members and non members. Single and back issues $2.00. Back volumes, $10 per volume.

This publication has been made possible through support and sponsorship extended by the Geophysics Research Division of the Air Force Cambridge Research Center under Contract No. A. F. 19 (122) 82. It is published for technical information only and does not represent the recommendations or conclusions of the sponsoring agency.

# METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 3 MARCH 1952 No. 3

## SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Climate of Paraguay, Uruguay and Argentina

(*For complete table of contents see back cover*)

---

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

# FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains from 175 to 300 abstracts of current periodical literature and monographs in the fields of meteorology, hydrology, oceanography, etc. These abstracts are arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of from 50 to 250 important references on a special subject without respect to recency of material. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject. Preference is given to recent material, comprehensive works, material from obscure sources, and items with good bibliographies.

Bibliographies previously published were:

| No. | Mo. | Vol. I, 1950 | Vol. II, 1951 |
|---|---|---|---|
| 1. | Jan. | **Atmospheric Pollution** | **Extended Forecasting** |
| 2. | Feb. | **Aerobiology** | **Long Range Forecasting** |
| 3. | March | **Cloud Physics and "Rain Making"** | **Soil Temperature** |
| 4. | April | **Hail** | **Constants, Units, Tables and Diagrams** |
| 5. | May | **Tornadoes** | **Climate of the Near East** |
| 6. | June | **Volcanic Dust** | **Climate of the Middle East** |
| 7. | July | **Climatic Changes** | **Special Winds** |
| 8. | Aug. | **Thunderstorms** | **Radar Storm Detection** |
| 9. | Sept. | **Icing** | **Condensation Trails** |
| 10. | Oct. | **Acoustical Propagation** | **Climate of Northeast Africa** |
| 11. | Nov. | **Evaporation** | **Mountain Meteorology** |

Bibliographies published this year were:

1. **Climatology of Northwest Africa,** Vol. III, No. 1, Jan. 1952
2. **Carbon Dioxide,** Vol. III, No. 2, Feb. 1952
3. **Climate of Paraguay, Uruguay and Argentina**

Forthcoming bibliographies will be:

4. **Dew,** Vol. III, No. 4, April 1952
5. **Objective Forecasting,** Vol. III, No. 5, May 1952
6. **Stratus Forecasting,** Vol. III, No. 6, June 1952
7. **Urban Climatology,** Vol. III, No. 7, July 1952

Other bibliographies in preparation are:

*Actinometers*
*Climate and Cancer*
*Climate of Central Africa*
*Climate of Southeast Asia and the East Indies*
*Frost and Frost Forecasting*
*Glazed Ice*
*Machine Methods in Meteorology*
*Microwave Propagation*
*Oceanographic Meteorology*
*Ozone*
*Stratus Forecasting*
*Tropopause Variations*
*Turbulence*
*Visibility*

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the June and December issues cumulative indexes are published.

# EXPLANATIONS

**Location of material:** For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

**Library symbols** used frequently may be found in the following list:

| | |
|---|---|
| **DA:** | U. S. Dept. of Agriculture Library, Washington, D. C. |
| **DBS:** | U. S. Bureau of Standards Library, Washington, D. C. |
| **DGS:** | U. S. Geological Survey Library, Washington, D. C. |
| **DLC:** | Library of Congress, Washington, D. C. |
| **DSI:** | Smithsonian Institution Library, Washington, D. C. |
| **DWB:** | U. S. Weather Bureau Library, Washington, D. C. |
| **GB-MO:** | Great Britain, Meteorological Office Library, Harrow, England. |
| **MH-BH:** | Harvard University, Blue Hill Observatory (and American Meteorological Society) Library, Milton, Mass. |
| **NN:** | New York Public Library, New York, N. Y. |
| **NNA:** | American Geographical Society Library, New York, N. Y. |

**Additional library symbols** used in this issue only:

| | |
|---|---|
| **DCGS:** | Coast and Geodetic Survey Library, Washington, D. C. |
| **DHO:** | Hydrographic Office Library, Washington 25, D. C. |
| **DPU:** | Pan American Union Library, Washington, D. C. |
| **DSG:** | U. S. Army Medical Library, Washington, D. C. |

**Other symbols:**

| | |
|---|---|
| * | before an entry indicates a good data source. |
| † | before an entry indicates a good bibliography. |
| § | before an entry indicates a synoptic case history study accompanied by charts. |

**Geographic locations** are in the English form rather than the form used locally, for example, Moscow for Moskva.

**Titles of articles or monographs** are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

**Abbreviations:**

*Titles of periodicals* are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

*Meteorologische Rundschau*, 2(5–6):146–151, May–June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5–6 (No. 5 and 6), *pages* 146–151, May–June 1950.

# PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

## GENERAL METEOROLOGY

3.3–1 551.5(08)

Malone, Thomas F. (*ed.*), **Compendium of meteorology.** Prepared under the direction of the Committee on the Compendium of Meteorology; H. R. Byers, H. E. Landsberg, H. Wexler, B. Haurwitz, A. F. Spilhaus, H. S. Willett, H. G. Houghton (chairman). Boston, American Meteorological Society, **1951.** 1334 p. charts, graphs, tables, refs. and biblios. Price $12.00. **DWB**—The **Compendium of Meteorology** has at last been published after over three years of planning, preparation, searching, writing and editing, not to mention the thousands of man-years of study, research, and experience that are brought to the work by the hundred odd authorities who have written the separate articles, and the ten thousand or so authors whose works (covering several centuries) are cited and digested in these articles.

The purpose of the **Compendium** is to make a detailed survey by subjects or to "take stock of the present position of meteorology . . . to summarize and appraise the knowledge . . . and to indicate the avenues of further study and research . . . to extend the frontiers of our knowledge." The 108 articles by 102 authors are divided into 25 sections according to the following broad subject headings: 1) Composition of the Atmosphere, 2) Radiation, 3) Meteorological Optics, 4) Atmospheric Electricity, 5) Cloud Physics, 6) Upper Atmosphere, 7) Cosmical Meteorology, 8) Dynamics of the Atmosphere, 9) General Circulation, 10) Mechanics of Pressure Systems, 11) Local Circulation, 12) Observations and Analysis, 13) Weather Forecasting, 14) Tropical Meteorology, 15) Polar Meteorology, 16) Climatology, 17) Hydrometeorology, 18) Marine Meteorology, 19) Biological and Chemical Meteorology, 20) Atmospheric Pollution, 21) Clouds, Fog and Aircraft Icing, 22) Meteorological Instruments, 23) Laboratory Investigations, 24) Radiometeorology and 25) Microseisms. Finally, there is an 18 page (3 column) subject index wherein you can find reference to Angels, Ball lightning, Aviation medicine, De-excitation by collision, Dust devils, Grosswetterlage, Kaltlufttropfen, Kibel's method, Sferics or any other subject you wish to "bone-up" on (except Austausch, Dew, History of Meteorology, and a few other minor subjects). Not much space is given to Agricultural Meteorology, although Industrial Meteorology is fully treated.

Although the entire volume is in the English language, the authors are from many countries (Germany, Sweden, Japan, India, England, Belgium, Norway, Denmark, Austria, etc.). Articles originally written in German have been carefully translated into English. Some authors wrote more than one article, and there are many subjects on which two or more authors wrote, thus presenting different points of view. All references have been carefully checked and edited, so that the volume represents an excellent bibliographic source.

Only a very few of the articles constitute original contributions, though many contain summarizations or representation of original work of the author. Credit for sponsoring this monument to meteorology is due to the Geophysics Research Division of the U. S. Air Force Cambridge Research Center as well as to the American Meteorological Society.

Each article will be abstracted separately and published in early issues of *Meteorological Abstracts*. *Subject Headings:* **1. General meteorology 2. Compendium of Meteorology 3. Bibliographies 4. Progress in meteorology. I. American Meteorological Society, Committee on the Compendium of Meteorology. II. Houghton, H. G.** (*chairman*). **III. U. S. Air Force. Cambridge Research Center. Geophysics Research Division.**—*M.R.*

3.3–2 551.5

Büdel, Anton, **Wetterkunde leicht gemacht.** [Meteorology simplified.] München, F. Ehrenwirth [1949]. 108 p. 68 figs., 4 tables. **DLC**—Answers to 99 questions about meteorology or meteorological phenomena are given in popular form with many diagrams and drawings to help the amateur understand the physical processes involved. The practical

aspects are well mixed with theoretical in discussion of radiation, humidity, air masses, the stratosphere, etc. Useful tables for determining absolute and relative humidity are included. *Subject Heading:* **1. Popular meteorology.**—*M.R.*

3.3–3 551.5(03)

Belgium. Institut Royal Météorologique, **Vocabulaire météorologique Français-Néerlandais.** [French-Dutch meteorological glossary.] 39 p.+45 p. Brussels [n.d.]. **MH-BH**—A glossary of over 1000 words, used in daily weather reports issued in either or both languages used in Belgium (Dutch and French), has been carefully prepared by L. DUFOUR and A. PIEN of the Institut Royal Météorologique de Belgique and checked for difference in usage between Belgium and Holland by W. BLEEKER. A clever system has been used to avoid giving precedence to either language—the alternate glossary Meteorologische Woordenlijst Nederlands—Frans, is printed separately and bound upside down to the other. *Subject Headings:* **1. Glossaries 2. Dutch language 3. French language.**—*M.R.*

3.3–4 551.5:02

**Napier Shaw Library, Cambridge.** *Meteorological Magazine*, London, 80(950):230–231, Aug. **1951.** fig. **DWB**—Describes formal opening June 11, 1951 and illustrates SHAW's coat of arms. *Subject Headings:* **1. Meteorology 2. Cambridge University, Napier Shaw Library.**—*C.E.P.B.*

3.3–5 551.5:06

Absalom, H. W. L., **General assembly of the International Union of Geodesy and Geophysics, Brussels, 1951.** *Meteorological Magazine*, London, 80(953):326–330, Nov. **1951. MH-BH**—Brief summaries of programs of Associations of Meteorology, Terrestrial Magnetism and Electricity, Hydrology, Physical Oceanography and Seismology, and final Plenary Session. *Subject Headings:* **1. Conferences: I. International Union of Geodesy and Geophysics.**—*C.E.P.B.*

3.3–6 551.5:06(058)(43)

Germany. Meteorologisches Amt für Nordwestdeutschland, **Bericht über die Tätigkeit im Jahre 1950.** [Report on the activity in 1950]. Hamburg [**1951**]. 24 p. 3 charts. **DWB**—This annual report deals with the organization and activities during 1950 of the central office in Hamburg and subsidiary offices. It includes a list of publications (official and by the staff), a chart of stations, voyages of the "Meerkatze" and routes of the merchant fleet observing ships. *Subject Headings:* **1. Meteorological services 2. Germany.**—*C.E.P.B.*

3.3–7 551.5:06(058)(410)

Great Britain. Meteorological Office, **Annual report of the Director . . . presented by the Meteorological Committee to the Secretary of State for Air for the year April 1, 1950 to March 31, 1951.** London, H. M. Stationery Office, **1951.** 53 p. 2 figs. At head of title M.O. 553.—Includes a full account of the services rendered by the Meteorological Office in forecasting and climatology, the organization for research and development, staff, technical discussions, supply of instruments, library and publications, and international cooperation. Among the appendices is a full list of publications by members of the staff. *Subject Headings:* **1. Annual reports 2. Great Britain, Meteorological Office.**—*C.E.P.B.*

3.3–8 551.5:061.4

Marshall, W. A. L., **Festival of Britain, 1951.** *Meteorological Magazine*, London, 80(948): 165–169, June **1951.** fig., 3 photos. **DWB**—A description, plan, and photos of the meteorological exhibit in the Dome of Discovery—climatology, instruments, synoptic meteorology and forecasting unit, and upper air section. *Subject Headings:* **1. Meteorology 2. Exhibitions 3. Great Britain.**—*C.E.P.B.*

3.3–9 551.5:372.22

Beck, F. Xaver, **Meteorologie in der Grundschule.** [Meteorology in the elementary school.] *Annalen der Meteorologie*, 4(1–6):245–248, **1951. MH-BH**—Some general sugges-

tions for teaching weather knowledge to young children, including sketching, simple climatic observations, mapping, and physical causes. *Subject Heading:* **1. Teaching of meteorology.**—*C.E.P.B.*

3.3–10 551.5:373.5

Voigts, Heinrich, **Zur Frage des meteorologischen Unterrichts an den höheren Schulen.** [On the question of teaching meteorology in institutions of higher learning.] *Annalen der Meteorologie*, 4(1–6):237–245, **1951.** fig. German and English summaries p. 237. **MH-BH**—The value of meteorology as an educational subject and its economic importance are described. A possible curriculum, the cooperation of meteorologists, the practical work of school meteorological observations, and the training of teachers are discussed. *Subject Heading:* **1. Teaching of meteorology.**—*C.E.P.B.*

3.3–11 551.5:517.512.2

Bartels, Julius, **Zur Morphologie geophysikalischer Zeitfunktionen II.** [On the morphology of geophysical time functions II.] (In: Akademie der Wissenschaften, Berlin, **Miscellanea Academica Berolinensia, Gesammelte Abhandlungen zur Feier des 250 jährigen Bestehens der Deutschen Akademie der Wissenschaften.** Vol. 1. Berlin, Akademie Verlag, **1950.** p. 69–81. 33 refs.) **DWB**—Discusses methods of investigating time-series and constructing mathematical models—superposing synchronized series, research on singularities, smoothing, and invariance of morphological peculiarities (e.g., daily pressure curves for a single year resemble 30-year means with scale difference of $\sqrt{30}$). Methods of examination include harmonic analysis and progressive summation or differencing. These are exemplified by lunar tides and terrestrial magnetism. *Subject Headings:* **1. Harmonic analysis 2. Lunar tides 3. Terrestrial magnetism.**—*C.E.P.B.*

3.3–12 551.5:621.315

Forrest, J. S., **Weather and electrical research.** *Weather*, 6(9):262–266, Sept. **1951.** plate, 7 refs. **DWB**—A popular account of relation of heating and lighting electrical load to weather and daylight illumination, research into frequency and magnitude of lightning flashes to earth, power losses in high voltage transmission and research on insulators and their corrosion. *Subject Headings:* **1. Meteorological elements 2. Transmission lines.**—*C.E.P.B.*

3.3–13 551.5:63:06

Fischer, Alfons, **Agrarmeteorologische Tagung in Neustadt/Weinstr.** [Agricultural meteorological meeting in Neustadt.] *Naturwissenschaftliche Rundschau*, 4(10):444–445, Oct. **1951. DWB**—Account of meeting of Scientific Society for Agriculture and Forestry with Rheinland-Pfalz Weather Service, March 4–5, 1950, with short summaries of papers. *Subject Headings:* **1. Agricultural meteorology 2. Conferences.**—*C.E.P.B.*

3.3–14 551.5:632.187

Reneuve, Paul, **Les méthodes d'évaluation des dangers d'incendie forestier en Amérique du Nord.** [Methods of evaluating the dangers of forest fire in North America.] *Québec [Province], Dept. of Lands and Forests, Bureau of Meteorology, Bulletin* No. 19 [n.d.]. 12 p. 3 figs., 3 tables, 3 refs. Reprint from: *Revue Forestière Française*, No. 6, June **1950. DWB**—The methods of evaluating the danger of forest fires and of estimating the inflammability of forests, which are discussed, are those used in the Province of Quebec. The index of inflammability is based upon atmospheric temperature, relative humidity and wind velocity and upon the combustible condition of the forest which is a function of the state of exploitation of the forest and of the growing season. The base index of inflammability is discussed and the application of the meteorological variables to this base index in order to evaluate the inflammability of the forest is described. *Subject Headings:* **1. Forest fires 2. Meteorological elements.**—*I.L.D.*

3.3–15 551.5:92

Flohn, Hermann, **Reinhard Süring †.** *Petermanns Geographische Mitteilungen*, 95(4):263, **1951. DLC**—Brief obituary (May 15, 1866–Dec. 27, 1950). *Subject Headings:* **1. Biography 2. Süring, Reinhard.**

3.3–16 551.5:92

Georgi, Johannes, **William Herbert Hobbs, ein Klassiker der wissenschaftlichen Arktisforschung.** [W. H. Hobbs, a veteran of scientific Arctic exploration.] *Polarforschung*, 3(1):9–12, **1951. DWB**—An account of the life and work of W. H. HOBBS with special reference to the Greenland expeditions and the "glacial anticyclone." *Subject Headings:* **1. Expeditions 2. Biography 3. Hobbs, William Herbert.**—*C.E.P.B.*

3.3–17 551.5:92

Groen, P., **In memoriam Vilhelm Bjerknes.** [Obituary of Vilhelm Bjerknes.] *Hemel en Dampkring*, 49(9):160, **1951. DLC**—Refers mainly to his team of workers in founding the "Norwegian school." *Subject Headings:* **1. Bjerknes, Vilhelm F. K. 2. Biography.**—*C.E.P.B.*

3.3–18 551.5:92

Hennessey, J., **Retirement of Dr. H. Jameson.** *Marine Observer*, 21(154):232–233, Oct. **1951.** photo. **MH-BH**—Brief account of DR. HAROLD JAMESON'S work at Colombo and in the Marine Branch of the Meteorological Office. Born June 3, 1887, retired May 31, 1951. *Subject Headings:* **1. Biography 2. Jameson, Harold.**—*C.E.P.B.*

3.3–19 551.5:92

Hesse, Walter, **Zum 10jährigen Todestag von Leo Gburek.** [Tenth anniversary of the death of L. Gburek.] *Polarforschung*, 3(1):32, **1951. DWB**—Born April 18, 1910. Made magnetic studies including German Antarctic Expedition 1938/39. Killed flying over Orkneys, Jan. 17, 1941. *Subject Headings:* **1. Biography 2. Gburek, Leo.**

3.3–20 551.5:92

**Inspecteur-Général E. Delcambre.** *Meteorological Magazine*, London, 80(952):304–305, Oct. **1951. MH-BH**—Brief obituary. *Subject Headings:* **1. Biography 2. Delcambre, E.**

3.3–21 551.5:92

Robitzsch, Max, **V. Bjerknes †.** *Zeitschrift für Meteorologie*, 5(9):257–258, Sept. **1951. MH-BH**—An account of BJERKNES' work in dynamical meteorology. *Subject Headings:* **1. Biography 2. Bjerknes, Vilhelm F. K.**

3.3–22 551.5:92

Schmauss, August, **Alfred Wegeners Leben und Wirken als Meteorologe.** [Alfred Wegener's life and work as a meteorologist.] *Annalen der Meteorologie*, 4(1–6):1–13, **1951. MH-BH**—An address to celebrate WEGENER'S 70th birthday (born Nov. 1, 1880). After a brief reference to his early life and work at Lindenberg, it describes his various expeditions to Greenland, with extracts from the reports and comments by other meteorologists. Other activities are also summarized, with references to his more outstanding publications. *Subject Headings:* **1. Biography 2. Wegener, Alfred.**—*C.E.P.B.*

## METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

### STATISTICAL METHODS

(*See also item:* 3.3–55)

3.3–23 551.501:519.2

†Van der Bijl, Willem, **Fünf Fehlerquellen in wissenschaftlicher statistischer Forschung.** [Five sources of error in statistical scientific investigation.] *Annalen der Meteorologie*, 4(1–6):183–212, **1951.** 9 figs., tables, 43 refs., equations. German and English summaries p. 183. **MH-BH**—Author describes 5 errors in statistics: 1) the most important is the sampling error—when conclusions from a sample are applied without reservations to the whole population; 2) selection effect—due to uncritical choice of data, e.g., selection of most favorable of several samples; 3) persistence effect—if several successive observations are autocorrelated the

effective number of observations is less than the actual number; 4) the $a(a-b)$ effect—i.e., the correlation of two series one of which enters into the other; and 5) the rare curvature effect—which occurs when dealing with sections of a convex curve. The memoir is illustrated by meteorological examples. *Subject Heading:* **1. Statistical techniques.**—*C.E.P.B.*

3.3–24 551.501.4

Lingelbach, Ernst, **Neue Zeitsparende Methode zur Ausführung von Rechenoperationen.** [New time-saving method of carrying out calculations.] *Annalen der Meteorologie*, 4(1–6):123–125, **1951.** fig., 2 refs. German and English summaries p. 125. **MH-BH**—Outlines a method by which sections of an isobaric chart are represented by black columns and scanned by photocells for actual pressures and differentials. This gives simplified charts on which, by the use of simple governing elements, arithmetical operations can be carried out by selective photocells. In this way, charts can be analyzed and synthesized rapidly enough for practical forecasting. *Subject Heading:* **1. Mathematical forecasting.**—*C.E.P.B.*

3.3–25 551.501.45

Conrad, Victor A., **A method of estimating the periodic constituent of a geophysical series.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:324–337, **1951.** 4 figs., 5 tables. English, German and French summaries p. 324–325. **DWB**—A criterion for the reality of the first harmonic of 12 equidistant values is obtained, from which the part of the series which is periodic can be found as a percentage. This is applied to various geophysical annual variations and is near 67% in a large number of cases (except annual variation of temperature in continental climates). Applied to annual variations of temperature in 9 hot springs, it divides them into 2 groups with more (real) and less(unreal) than 60% periodic constituent. *Subject Headings:* **1. Periodogram analysis 2. Geophysical time series.**—*C.E.P.B.*

3.3–26 551.501.45:551.591

Guss, Hans, **Zur Struktur von Häufigkeitsverteilungen und Bildung von Mittel- und Schwankungswerten der Sichtweite.** [On the structure of frequency distributions and construction of mean and variation scales of visibility.] *Annalen der Meteorologie*, 4(1–6):27–39, **1951.** 9 figs., 3 tables, 25 refs. English summary p. 27. **MH-BH**—A discussion of the applicability of the Gauss normal distribution and arithmetic mean to meteorological data, with special reference to visibility. For this, he advocates the *geometric mean Mg* and a scale increasing geometrically. The 1949 international scale gives an illusory appearance of accuracy as shown by frequency distributions for Munich and Berlin; the old 0–9 scale gives an approximate Gaussian distribution. Curves for a number of stations at different hours are discussed, also *Mg* and mean departure *Mg/s* where *s* is root mean square of geometric departure (i.e., of logarithm). A similar transformation can be applied to other elements with a non-linear distribution, such as wind force. *Subject Headings:* **1. Statistical techniques 2. Frequency distributions 3. Visibility.**—*C.E.P.B.*

3.3–27 551.501.45:519.2

Kejla, Jaroslav, **Trend v meteorologii.** [Trends in meteorology.] *Meteorologické Zprávy*, 4(3–4):83–85, **1950.** 2 figs., 2 tables, 6 refs., 30 equations. **DWB**—A detailed presentation of theory and practice of application of statistical methods to the study of trends in meteorological data. Smoothing techniques and correlation methods are also considered and examples given. *Subject Headings:* **1. Statistical techniques 2. Climatic trends.**—*M.R.*

3.3–28 519.2

Bull, G. A. and Knighting, E., **A property of bi-variate normal distributions.** *Mathematical Gazette*, London, 34:127–129, **1950.** equations. **NN**—If an elliptical distribution is made up of normal $x$ and $y$ distributions, 80% of observations lie inside a circle centered on $m$

with radius 1.24 times mean square. *Subject Headings:* **1. Statistical techniques 2. Frequency distributions.**—*C.E.P.B.*

3.3–29 519.2

Fujita, T., **A note on correlation.** *Journal of Meteorological Research*, Tokyo, 2(10):323–328, Nov. **1950.** 3 figs., 2 tables, equations. In Japanese, English summary p. (10). **MH-BH**—If the value of an element at one place $X$ is related to the values at a number of equidistant intercorrelated neighboring places, it is found that multiple correlation of $X$ with neighboring places rapidly converges to a constant value as number of places used is increased. Consequently only a few places need to be used. *Subject Heading:* **1. Correlations.**—*C.E.P.B.*

3.3–30 519.2:550.3:551.461.2

Seiwell, H. R., **Problems in statistical analyses of geophysical time series.** *Science*, Washington, 112(2905):243–246, Sept. 1, **1950.** 4 figs., 15 refs. **MH-BH**—The author investigates the extent to which a physical hypothesis can be formulated from the results of mathematical analysis of geophysical time series, with special reference to ocean waves. The physical properties of sea surface waves differ depending upon whether they are analyzed by the periodogram or autocorrelation method. According to the former technique, ocean wave patterns are combinations of frequencies generated by a distant storm which had travelled independently to the target; according to the latter, they are the result of a single frequency which reached the target from a distance and upon which locally generated disturbances have been superimposed. The application of periodogram analysis to random numbers and to a sine function of finite scope, demonstrates the existence of periodicity when none exists physically; while the application of the autocorrelation method to similar data fails to reveal any periodicity. The correlogram model based upon the function $y=A \sin 2\pi/10+E$ is found to be typical of that obtained sometimes from ocean wave data and the properties of sea surface wave patterns can be predicted from this correlogram model. *Subject Headings:* **1. Statistical analysis 2. Geophysical time series 3. Periodicities 4. Wind caves.**—*I.L.D.*

3.3–31 519.2

Suzuki, E., **On the difference** (*sic*) **time series. (II.)** *Meteorological Society of Japan, Journal, 2nd Ser.*, 27(12):376–380, Dec. **1949.** fig., 7 refs., equations. In Japanese, English summary p. 40. **MH-BH**—A study of pseudo-periodicities, shown by autocorrelation, resulting from taking successive differences in time series $n$ times. *Subject Headings:* **1. Autocorrelations 2. Periodicities.**

3.3–32 519.2

Wolf, Helmut, **Kennzeichen für den linearen Charakter einer empirisch ermittelten Gesetzmässigkeit.** [Criteria for the linear character of an empirically determined relationship.] *Meteorologische Rundschau*, 2(11/12):321–323, Nov./Dec. **1949.** 10 refs., 11 equations. **DWB**—Relation between a number of pairs of values of l's and l's may be expressed in form $1+v=s+t(1'+v')+u(1'+v')^2+ \ldots$, where $s$, $t$, $u$ are unknown constants. If any of $s$, $t$, $u$ . . . are less than their mean deviation they can be assumed zero. Author defines a criterion $\mu_0$ based on ratios of $vv$ and $v'v'$ to standard deviations of l's and l's, the changes of which as order of polynomial rises indicate most plausible relationship, and other criteria based on $\mu_0$. *Subject Heading:* **1. Correlations.**—*C.E.P.B.*

3.3–33 519.241.2:551.509

Ogawara, M., Ozawa, T. and Tomatsu, K., **Diagrams of confidence limits of occurrence probability.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(6):181–193, June **1951.** fig., tables, 13 refs., equations. In Japanese, English summary p. 193. **MH-BH**—Given $k$ occurrences of an event in $N$ trials, the upper and lower limits of probability of occurrence in any given trial are calculated for confidence limits of 90 and 98%. These are shown in tables and diagrams. The application to statistical forecasting is discussed. *Subject Headings:* **1. Probability theory 2. Statistical forecasting.**—*C.E.P.B.*

## OBSERVATIONAL DATA

(*See also items:* 3.3–143, 3.3–210)

3.3–34 551.506:697

Lacy, R. E., **Variations of the winter means of temperature, wind speed and sunshine, and their effect on the heating requirements of a house.** *Meteorological Magazine*, London, 80(948):161–165, June **1951.** fig., 2 tables, 3 equations. **DWB**—Equations are given connecting mean and variance of winter fuel requirements of a house with means and variances of temperature, wind speed and sunshine. Values are given for Kew Observatory. *Subject Headings:* **1. Climatological prediction 2. Heating and ventilating.**—*C.E.P.B.*

3.3–35 551.506:519.25

Smith, L. P., **Random errors in standard observations.** *Meteorological Magazine*, London, 80(950):236, Aug. **1951.** 2 tables. **DWB**—Four complete sets of thermometers with identical exposures at Kew Observatory were read regularly. Standard deviations from means of all four were calculated and frequencies of individual errors discussed. *Subject Headings:* **1. Observational errors 2. Thermometers.**—*C.E.P.B.*

3.3–36 551.506.1(058)(961.2)

*Apia. Observatory, **Annual report for 1941.** Wellington, New Zealand, **1950.** 170 p. tables. **DWB**—Description of observatory (site, equipment, staff) and of the work done in 1941 in terrestrial magnetism, meteorology, and atmospheric electricity at Apia, and a brief climatological summary for Atafu. Report consists of a summary of conditions during each month, of remarkable occurrences during year for each element observed and of detailed tables of daily observational data as well as monthly, annual and normal data. *Subject Headings:* **1. Observational data 2. Yearbooks 3. Apia Observatory 4. Apia, Western Samoa.**—*M.R.*

3.3–37 551.506.1(866)

*Ecuador. Servicio Meteorológico, **Resumenes anuales correspondientes a 1944, 1945, 1946, 1947.** [Annual summaries covering 1944, 1945, 1946, 1947.] *Ecuador, Servicio Meteorológico, Boletín Meteorológico* No. 3, **1950.** 95 p. chiefly tables. **DWB**—Summary includes geographical coordinates, exposure of instruments and presentation of pressure, temperature, humidity, evaporation, precipitation, sunshine, cloudiness and wind for Quito. Wind tables are presented in the form of frequencies from various directions at the fixed hours of observation. Tables also include occurrences of thunderstorms, hail, ice, fog, and showers. Pt. II includes same for the network of 31 other stations in Ecuador. A table with stations and their lat., long., and height is given. *Subject Headings:* **1. Meteorological observations 2. Annual reports 3. Ecuador.**—*M.R.*

3.3–38 551.506.1(42)

Fernley Meteorological Observatory, Southport, **Report and results of observations for the year 1948.** Southport, Eng., **1951.** 24 p. 19 tables. **DWB** –Includes hourly observations and extremes of the usual meteorological elements and also of UV radiation, evaporation, water levels and atmospheric pollution, and differences from average. *Subject Headings:* **1. Climatic data 2. Annual reports. I. Lidster, George A.**—*C.E.P.B.*

3.3–39 551.506.1(058)(43)

*Germany. Meteorologisches Amt für Nordwestdeutschland, **Deutsches Meteorologisches Jahrbuch, Britische Zone, 1945.** [Meteorological yearbook for northwest Germany, British Zone, 1945.] Hamburg, **1951.** 71 p. tables. **DWB**—This is the first of a new series of yearbooks, which contains all of the available data for the worst of the war years. It includes daily observations of the usual meteorological elements for Hamburg and Solingen; monthly and annual summaries for 15 second order stations, including sunshine duration and grass minimum temperatures, and a description of weather conditions in 1945; daily, monthly, annual and extreme values of precipitation for 91 stations. A list of stations with elevation

and coordinates, length of record, and observers is appended. A supplementary volume entitled: "Deutsches Meteorologisches Jahrbuch, Britische Zone, Ergänzungsheft" contains 38 pages of tables and notes constituting the phenological observations in Northwest Germany for 1945-48 and supplementary data and corrections for 1946–48, which were discovered after the main volume was published. *Subject Headings:* **1. Observational data 2. Climatic data 3. Yearbooks 4. Germany.**—*M.R.*

3.3–40 551.506.1(43)

*von Rudloff, Hans and Heitz, W., **Die Witterung im Jahre 1950. (Land Baden.)** [The weather during 1950. (Baden.)] *Baden, Landeswetterdienst, Jahresbericht mit Abhandlungen,* **1950.** p. 99–104. tables. **DWB**—Monthly data on mean monthly precipitation and temperature and a general discussion of the weather. This annual weather summary is a regular feature of the annual report. *Subject Headings:* **1. Climatic data 2. Annual reports 3. Baden, Germany.**—*I.L.D.*

3.3–41 551.506.8(777)

Shaw, R. H. and Thom, H. C. S., **On the phenology of field corn, the vegetative period.** *American Society of Agronomy, Journal,* Geneva, N. Y., 43(1):9–15, Jan. **1951.** 5 figs., 3 tables, 5 refs. **DA**—Experiments, conducted during 1947 and 1948 at Iowa State College, were designed to give information on the progress of the crop as an indicator of the date of maturing and thus of the quality of the crop. Data on time from planting to emerging, emerging to tasseling and tasseling to silking for early, medium and late hybrid corn were analyzed and correlated with temperature conditions for 1947 and 1948, respectively. *Subject Headings:* **1. Phenology 2. Agronomy 3. Iowa.**—*M.R.*

## INSTRUMENTS

(*See also items:* 3.3–82, 3.3–92, 3.3–191, 3.3–195, 3.3–198, 3.3–207)

3.3–42 551.507.362:551.508.29

Michigan. University, Engineering Research Institute, **Atmospheric phenomena at high altitudes.** Contract No. DA 36-039-sc-125, Progress Report No. 2, Quarterly Report for the period Jan. 1, 1951 to March 31, 1951, April 30, **1951.** 22 p. photos, diagrs., graphs, refs., equations. **DWB**—Methods and apparatus used in collecting samples of air at intermediate altitudes (by aerobee rockets) are satisfactory at high altitudes (around 100 km). No increased amount of intake into the collector was found to arise from a theoretical increase in pressure from the speed of the rocket. A new bottle opener, which was designed, is described and illustrated. Sc-19 Probe Aerobee for measuring upper air temperature was designed and tested. The sphere method for measuring ambient density and temperature is described theoretically. Calculation of errors due to Döppler error in acceleration formulated graphically and described. *Subject Headings:* **1. Rocket observation techniques 2. Upper air sampling. I. Contract DA 36-039-sc-125.**—*M.R.*

3.3–43 551.508.21

Georgi, Johannes, **Ein kleines, in sich eichfähiges Pyrheliometer.** [A small self-calibrating pyrheliometer.] *Annalen der Meteorologie,* 4(1/6):227-236, **1951.** 6 figs., 16 refs. **MH-BH**—Describes an instrument completed in 1950 in which a small copper receiver, thermally insulated, and a large substance of known temperature, are connected to a galvanometer. Measurements are made of rate of heating. Sample measurements on selected days, with and without red filter, are illustrated and discussed. *Subject Heading:* **1. Pyrheliometers.**—*C.E.P.B.*

3.3–44 551.508.21:551.521.63

Price, W. C., **Recent advances in ultra-violet absorption spectroscopy.** *Physical Society of London, Reports on Progress in Physics,* 14:1–18, **1951.** 5 figs., 76 refs. **DLC**—Author reviews recent progress in the design and construction of photoelectric spectrophotometers

and auxiliary equipment. On p. 11–12 the extension of the solar spectrum by high altitude rockets up to 155 km is described; records extended to 2300 Å with traces at 2230 Å showing numerous absorption lines and several bright lines, but the spectra appear to be less bright than expected from a solar temperature of 5500 K. *Subject Heading:* **1. Ultraviolet radiation.**—*C.E.P.B.*

3.3–45 551.508.25:551.521.4

Marlow, Douglas and Pemberton, J. C., **An automatic scanning and recording photometer for night sky studies.** *Review of Scientific Instruments*, 20(10):724–728, Oct. **1949.** 5 figs., refs. Abstracted from reprint. **DWB**—This paper describes the design, construction and performance of a photoelectric photometer "which scans the sky in 12 minutes, recording the light energy in a 100 Å band as a function of altitude and azimuth. The light is chopped by a rotating shutter and directed by a photomultiplier tube, the output from which is amplified and synchronously rectified to produce a d.c. signal for the graphic recorder. Three different types of automatic scanning are provided as well as a manual control of the various functions. The minimum energy which may be reliably recorded using a 4-inch f:1 lens is of the order of $10^{-13}$ watt." *Subject Headings:* **1. Photometers 2. Light of the night sky.**—*From author's abstract.*

3.3–46 551.508.26

Hinzpeter, Max, **Wärmeübergang bei Bimetallthermometern.** [Lag of bimetallic thermometers.] *Annalen der Meteorologie*, 4(1–6):291–295, **1951.** 3 figs., 12 refs. German and English summaries p. 291. **MH-BH**—An apparatus is described for measuring the lag of bimetallic thermometers in radiosondes. A formula and nomogram are given for determining lag constant as a function of rigidity of metal, length and ventilation. *Subject Headings:* **1. Radiosonde calibration 2. Nomograms.**—*C.E.P.B.*

3.3–47 551.508.5:551.558

Hartley, G. E. W., **Wind recording instruments near the site of the proposed suspension bridge over the Severn.** *Meteorological Magazine*, London, 80(952):284–288, Oct. **1951.** 7 figs. **MH-BH**—Describes and illustrates a bidirectional wind recorder giving besides wind speed, a record of horizontal direction and angle of inclination of the wind. *Subject Headings:* **1. Anemographs 2. Wind inclinometers.**—*C.E.P.B.*

3.3–48 551.508.54

Cawkwell, George E., **How to make an anemometer.** *Weather*, 6(9):287, Sept. **1951.** photo. **DWB**—Describes and illustrates amateur construction of an anemometer as described in *Meteorological Abstracts* item No. 8–19, 1950. *Subject Heading:* **1. Anemometers.**—*C.E.P.B.*

3.3–49 551.508.54

Swinbank, W. C., **The measurement of vertical transfer of heat and water vapor by eddies in the lower atmosphere.** *Journal of Meteorology*, 8(3):135–145, June **1951.** 9 figs., 4 tables, 4 refs., equations. **DWB**—A detailed description of the hot wire anemometer used to measure vertical wind fluctuations, and its theoretical basis, and of the calibration of the thermocouples is used to measure temperature flux, presented. The apparatus for measuring vapor pressure fluctuations is described briefly. By means of this apparatus a continuous record of the detailed structure of temperature, vapor pressure and total wind speed and its vertical component, and of the air passing over a particular fixed point can be obtained over a five minute interval. The theoretical equations for analyzing the traces are developed and the numerical results are presented. Observations indicate the occurrence of an upward eddy flux of water vapor while the gradient of absolute humidity was directed downward. *Subject Headings:* **1. Hot wire anemometers 2. Vapor pressure measurement.**—*I.L.D.*

3.3–50 551.508.71

Robitzsch, Max, **Die Angaben des Haarhygrometers.** [The indications of the hair hygrometer.] *Annalen der Meteorologie*, 4(1–6):133–135, **1951.** fig., equations. **MH-BH**—

Author defines saturation ratio $\gamma = e/E_t$ and saturation degree $\gamma' = e/E_{t'}$, where $t$, $t'$ are dry and wet temperatures. The reading of the hair hygrometer is proportional to $\gamma'$. Author gives a correction scale to the readings for pressure and temperature. *Subject Heading:* **1. Hygrometry.** —*C.E.P.B.*

3.3–51 551.508.74:551.579.5

Craddock, J. M., **An apparatus for measuring dewfall.** *Weather*, 6(10):300–308, Oct. **1951.** 6 figs. **DWB**—Description of a photographically recording lysimeter (soil balance) with full working details for construction. Method of working described and specimen records showing dewfall, rainfall and evaporation reproduced. *Subject Headings:* **1. Drosometers 2. Lysimeters.**—*C.E.P.B.*

3.3–52 551.508.812:551.524.7

Lugeon, Jean and Ackermann, Paul, **Bestimmung der Temperaturfalschmessungen von Radiosondenaufstiegen infolge des Trainageeffektes.** [Determination of the temperature errors of radiosonde ascents due to lag.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:338–342, **1951.** 4 figs., table, 6 refs. German, English and French summaries p. 338. **DWB**—The temperature errors of the Swiss radiosonde, due to lag caused by its mass, were determined by coupling it with a special sonde with no lag. In day ascents it varied from below 1°C at 7 km to nearly 8°C at 13 km. Isolation of the thermoelement is recommended. *Subject Heading:* **1. Radiosonde errors.**—*C.E.P.B.*

3.3–53 551.508.95

Vassy, Étienne and Vassy, Mme. Étienne, **Réalisation d'un appareil pour la mesure rapide de l'épaisseur réduite de l'ozone atmosphérique.** [Construction of an apparatus for the rapid measurement of the reduced thickness of atmospheric ozone.] *Groupement Français Aéronautique pour le Développement des Recherches Aéronautiques, Rapport Technique* No. 41, **1948.** 43 p. diagrs., graphs, tables, 30 refs. **DWB**—The author reviews the theory underlying the measurement of the thickness of the atmospheric ozone layer, the various types of cells and the Moll thermoelectric pile as receivers, the characteristics of filters for isolating spectral regions and of filters suppressing the visible and the near ultraviolet. A description of a specially designed apparatus consisting of a cell and an amplifier for measuring thickness of the ozone layer and the method and results of its calibration for measuring the reduced thickness of atmospheric ozone are presented. In the appendix the author discusses the effect of temperature upon the transmission of filters and the possibilities of measuring the condensable water in the atmosphere by utilizing the sunlight diffused by the atmosphere. *Subject Headings:* **1. Ozone meters 2. Ozone layer measurement.** —*I.L.D.*

3.3–54 551.508.952

New York University, College of Engineering, Research Div., **Ozonesonde development.** Contract No. AF 19(122)-238, Project No. 140, Progress Report No. 2, Nov. **1950.** 15 p. photos, diagrs., graphs, 4 refs. **DWB**—Work done in this period was mainly concerned with developing diffraction gratings and optical filters for use in a device for determining ozone in the stratosphere by ultraviolet absorption measurements in certain wave bands. *Subject Headings:* **1. Ozone measurement 2. Ozone meters. I. Murray, William D. II. Contract AF 19(122)–238.**—*M.R.*

## SYNOPTIC ANALYSIS AND FORECASTING

(*See also items:* 3.3–33, 3.3–114, 3.3–177)

3.3–55 551.509.1 551.501(26:001)

Great Britain. Meteorological Office, **Marine observer's guide. Information for the use of the voluntary observing fleet of the British Commonwealth of Nations co-operating with meteorological services.** 2nd ed. London, **1951.** pagination varied. 3 plates. M.O. 477.—

A loose-leaf folder containing information of use to observers on "selected ships"—including hints on observations, codes, shore W/T stations, warning signals, and glossary of terms used in shipping forecasts with equivalents in French, Spanish and Russian. *Subject Headings:* **1. Marine forecasting 2. Observer's manuals 3. Definitions.**—*C.E.P.B.*

3.3–56 551.509.3

Hollmann, Günther, **Zur numerischen Wettervorhersage.** [On numerical weather forecasting.] **Bericht über [Report on] J. G. Charney, R. Fjörtoft, J. V. Neumann: Numerical integration of the barotropic vorticity equation. (Tellus, Vol. 2, Nr. 4, 1950.)** *Zeitschrift für Meteorologie*, 4(11):342–345, Nov. 1950. 8 refs., 3 equations. **MH-BH**—A discussion of the possibility of improving forecasts by introducing mathematical methods. ROSSBY's barotropic field theory is considered but complete barotropy does not fully represent cyclonic conditions. CHARNEY and ELIASSEN's equations give good results at 500 mb level. Electronic computing on a model sufficiently complicated to represent the real atmosphere (Princeton Institute for Advanced Study) may realize RICHARDSON's "dream." *Subject Headings:* **1. Mathematical forecasting 2. Vorticity equations.**—*C.E.P.B.*

3.3–57 551.509.3:551.515.2

Morgan, David A., **A discussion of applications of the James energy ratio to typhoon forecasting and analysis.** *U. S. Air Force 2143D Air Weather Wing, Technical Bulletin*, 1(7):43–46, June 1951. graphs. **DWB**—The James energy ratio in typhoon forecasting and analysis is discussed. Its use is illustrated by application to three typhoons. The plot of maximum wind speed and of energy ratio at the vortex (*Ec*) show that *Ec* was less than one during the largest part of the interval during which intensification occurred. This result contradicts the conclusions of JAMES. *Subject Headings:* **1. Typhoon forecasting 2. James energy ratio.**—*I.L.D.*

3.3–58 551.509.3

Roulleau, J., **La recherche en météorologie.** [Research in meteorology.] *La Météorologie*, 4th Ser., No. 21:1–5, Jan.–March 1951. French, English and Spanish summaries p. 1. **MH-BH**—The problems most useful to forecasting that should be investigated are as follows: physical causes of the existence of permanent anticyclonic centers in the subtropical latitudes and the cause of atmospheric disturbances, radiation exchange in the atmosphere, the origin of small scale vertical movements and the precise distribution of temperature in the lower atmospheric layers. Special attention should be given to study of small scale meteorological problems. *Subject Headings:* **1. Meteorological research 2. Weather forecasting.**—*I.L.D.*

3.3–59 551.509.3

Scherhag, Richard, **Neue Wege für die Mittelfristvorhersagen.** [New method of medium range forecasting.] *Annalen der Meteorologie*, 4(1–6):163–176, 1951. 10 figs., 3 refs. German and English summaries p. 163. **MH-BH** –The general failure of 3–5-day forecasts is ascribed to the limited basis, especially in the upper air. Author considers that such forecasts can only be improved by considering the synoptic-aerological observations for the whole Northern Hemisphere. He makes a preliminary investigation of the relations between movements of frontal zones in 56–75°N and falling pressure at the surface and of centers of falling pressure at 500 mb level. The intensity of the fall region is related to divergence in the delta of the frontal zone. Two examples of the use of the new method are given. A good discussion follows. *Subject Heading:* **1. Extended forecasting.**—*C.E.P.B.*

3.3–60 551.509.3:517

Sutton, O. G., **Mathematics and the future of meteorology.** *Weather*, 6(10):291–296, Oct. 1951. fig. **DWB**—A philosophical discussion which arrives at the conclusion that indeterminacy due to the prevailing instability in the atmosphere will prevent accurate weather prediction by mathematical methods more than a few days ahead. *Subject Heading:* **1. Mathematical forecasting.**—*C.E.P.B.*

3.3–61 551.509.311

Godson, Warren L., **Synoptic properties of frontal surfaces.** *Royal Meteorological Society, Canadian Branch [Publications]*, 2(1), Jan. **1951.** 7 p. 9 figs., equations. Mimeographed. **DWB**—Emphasizes importance of 3-dimensional frontal analysis in relation to pressure changes, jet stream and vertical motion. The properties of frontal surfaces are set out and the winds and their vertical shear perpendicular and parallel to the front analyzed. *Subject Heading:* **1. Frontal analysis.**—*C.E.P.B.*

3.3–62 551.509.312

Hinkelmann, Karl, **Quantitave** (*sic*) **Verfahren zur Vorausberechnung von Luftdruckfeldern.** [Quantitative experiments in calculating pressure fields in advance.] *Annalen der Meteorologie*, 4(1–6):126–131, **1951.** 6 figs., 2 refs., 3 equations. Summaries in German and English p. 126. **MH-BH**—Attempts to compute future atmospheric conditions by numerical solution of the hydro- and thermodynamical equations have given promising results, but the amount of calculation involved and the lack of suitable calculating instruments are obstacles. Hence the author constructs 3 simplified equations. These are applied to the 500 mb topography over North Atlantic and Europe, 3 hr and 15 hr on April 5, 1950 to calculate a chart of $dh/dt$. *Subject Heading:* **1. Mathematical forecasting.**—*C.E.P.B.*

3.3–63 551.509.317

Reuter, Heinz, **Zur numerischen Methode der Vorhersage von Änderungen der 500 mb-Fläche nach Charney und Eliassen.** [On the numerical method of forecasting changes of the 500 mb surface according to Charney and Eliassen.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:122–127, **1951.** 4 figs., 3 refs., 2 equations. German, English and French summaries p. 122. **DWB**—Author investigates the thesis that the day-to-day changes of the 500 mb topography can be calculated from the land topography (*see item* 2-48 in Feb. 1950 *Meteorological Abstracts*). Using data for Jan. 9–15, 1949, he finds that the method is only successful when small perturbations exist along a rather uniform current parallel to the latitude. *Subject Headings:* **1. Mathematical forecasting 2. Waves in the westerlies.**—*C.E.P.B.*

3.3–64 551.509.318

Scully, E. C., **Notes on synoptic analysis and forecasting of Mediterranean summer weather.** *American Meteorological Society, Bulletin*, 32(5):163–165, May **1951. MH-BH**—Fronts are rare in the Mediterranean from June through August. The presence of fronts at this time is indicated by the sudden change in wind pattern. Fronts become numerous in September. Their development and characteristics are described. The origin, characteristics and track of the transient cyclonic cells originating in the Atlas mountains and in the Gulf of Lions are discussed. These cells, land and sea breezes, and cyclone formation in the western Mediterranean make forecasting from climatological records difficult and unreliable. The most useful upper air level was the 500 mb level. *Subject Headings:* **1. Synoptic forecasting 2. Fronts 3. Mediterranean Region.**—*I.L.D.*

3.3–65 551.509.33:551.509.319:551.515.7

§Brezowsky, Helmuth, **Synoptische Methoden zur Vorhersage von Umsteuerungen im atlantisch europäischen Raum.** [Synoptic methods of forecasting steering in the Atlantic-European region.] *Annalen der Meteorologie*, 4(1–6):295–309, **1951.** 18 figs., 4 refs. German and English summaries p. 295. **MH-BH**—"Starting from considerations of atmospheric circulation based on horizontal temperature distribution as defined by Seilkopf, this paper studies anticyclonal changes of steering. In accordance with the principle of the formation of first-order double cold sectors, the conditions causing limited and blocking anticyclonic changes of steering are described. A qualitative method is described for forecasting such double cold sectors and for determining from the initial situation the location where the developing anticyclone will become stationary." *Subject Headings:* **1. Anticyclogenesis 2. Steering.**—*Author's abstract.*

3.3–66 551.509.33(04)

Gregor, Alois, **Dlouhodobé předpovědi počasí.** [Long range weather forecasts.] *Meteorologické Zprávy*, 4(1–2):36–37, **1950.** fig. Excerpt from the book "Úvahy o počasí pro rolníky." [Reflections on weather for farmers.] **MH-BH** A popular review of several schools of long range forecasting and their relative merits. Meteorologists have endeavoured to work out long range forecasts based on periods of recurrence of weather types. Such periods have been established from 2–3-day up to 744-year periods, but their practical value is very limited. Another method, found by WEICKMANN, is based on the "reflected image" or symmetry of a pressure curve. BAUR worked on the basis of determining all physical factors of a weather situation and finding analogous conditions in earlier cases. He claims an accuracy as high as 80% in his 10-day forecasts (!!). CLAYTON based his forecasts mainly on solar activity. MULTANOVSKII's method is based on the situation and motion of centers of pressure formations. All these methods are as yet far from yielding reliable results, but researches are being carried on. *Subject Headings:* **1. Long range forecasting 2. Popular meteorology.**—*G.T.*

3.3–67 551.509.33:519.2

Hofmann, Alfred, **Zur Methodik der langfristigen Witterungsvorhersage.** [On the methodology of long range weather forecasts.] *Annalen der Meteorologie*, 4(1–6):160–163, **1951.** German and English summaries p. 160. **MH-BH** –Author compares step by step, a "statistical" forecast by F. BAUR for June 1950, with a "forecast" based on a sample of 8 that the names of the majority of the staff of 308 in an office begin with the letter H. The latter is patently absurd, but author thinks the former has a physical basis. *Subject Heading:* **1. Statistical forecasting.**—*C.E.P.B.*

3.3–68 551.509.33:551.577

Schmidt, Reinhart C., **A method of forecasting occurrence of winter precipitation two days in advance.** *Monthly Weather Review*, 79(5):81–95, May **1951.** 7 figs., 9 tables, 10 refs. **DWB**—Starting with the novel hypothesis that no winter precipitation will occur in the Washington, D. C.-Baltimore area unless sufficient moisture flows into the area aloft (and vice versa), a single parameter system of forecasting for 48 hours in advance was tested, giving scores of 86% compared with 68% for official forecasts made at Washington National Airport. The single parameter used was the trajectory of air reaching Nashville, Tenn. at 850 mb level. If the flow was essentially from the NW or SE, *no rain*, and if from the SSW or S, *rain* was forecast. To further improve the skill score, certain other parameters were introduced, based on 700 or 850 mb flow at Atlanta, Ely, Grand Junction, etc. as well as Nashville, Oklahoma City, and Little Rock. Independent data were used to verify accuracy and a test made in Jan. 1951, using rules promulgated. *Subject Headings:* **1. Objective forecasting 2. Precipitation forecasting 3. Washington, D. C.**—*M.R.*

3.3–69 551.509.34:551.515.2

Gherzi, Ernest, **Traçado das cartas meteorológicos e previsões.** [Drawing weather maps and forecasting.] *Macao, Observatorio Meteorológico, Notas Científicas*, No. 2:19–23, **1951.** In Portuguese, English translation p. 27–30. **DWB**—Random notes on methods of analysis and forecasting typhoons and their movements in the China area, based on the author's 32 years' experience in that region. Shortcomings of reporting service, codes, etc. enumerated. *Subject Headings:* **1. Hurricane forecasting 2. Synoptic analysis 3. China Seas.**—*M.R.*

3.3–70 551.509.39:551.577

Kraght, Peter E., **On the spread of precipitation areas and forecasting onset time of precipitation.** *American Meteorological Society, Bulletin*, 32(5):159–162, May **1951.** 6 figs., table, equations. **MH-BH** –The author devises an expression for the velocity of an onset isochrone of precipitation in terms of the local acceleration of the onset isochrone and the velocity of the system causing the precipitation or associated with the precipitation. In the equation $t_0 = h - e$ (where $t_0$ is the actual time of onset, $h$ the hour at which precipitation was forecast and $e$ the error of the forecast) $h$ is determined from the past history of the onset

isochrone in the system producing the precipitation and $e$ is associated with the acceleration. An example of computation of the acceleration of precipitation is presented. *Subject Headings:* **1. Precipitation forecasting 2. Precipitation distribution.**—*I.L.D.*

3.3–71 551.509.51

Caroli, Günther, **Grundsätzliche Fehler in Vorhersagen.** [Basic errors in forecasting.] *Baden, Landeswetterdienst, Jahresbericht mit Abhandlungen,* **1949.** p. 25–31. 8 figs., 6 tables. **DWB**—Weather forecasts of 1938 made at Stuttgart and Munich were examined in order to determine whether any errors of forecasting were fortuitous or due to some fundamental defect of method. The procedure for judging the success or failure of a forecast is described, the frequency of erroneous forecasts is given in tables and the pressure conditions associated with erroneous forecasts are discussed. It is concluded that errors in forecasting were due to energy transfers in the atmosphere which cannot be taken into account during forecasting. In 1938 the errors were due to the occurrence of föhn conditions and to an almost uniform association of bad weather with upper lows and fair weather with upper highs. *Subject Headings:* **1. Forecast errors 2. Stuttgart, Germany 3. Munich, Germany.**—*I.L.D.*

## CLOUD SEEDING AND ARTIFICIAL PRECIPITATION

3.3–72 551.509.66/7

Shellard, H. C. and Grant, D. R., **Results of an artificial nucleation experiment.** *Meteorological Magazine,* London, 80(951):253–255, Sept. **1951.** 4 photos. **MH-BH**—St. Cu. at 9000–9500 ft over S. E. England March 9, 1951, was seeded with dry ice along three lines. clear lanes developed and merged and a wind shear occurred. Visual and radar photos given. Some snow fell in small flakes. *Subject Headings:* **1. Cloud seeding 2. Artificial precipitation 3. Dry ice.**—*C.E.P.B.*

3.3–73 551.509.67

Elliott, Robert D., **Increasing precipitation through cloud seeding.** *Weatherwise,* 4(4):88–90, Aug. **1951.** 4 figs. **MH-BH**—A simple description of the FINDEISEN-BERGERON theory of rain formation and of the mode of action of seeding with silver iodide in producing and increasing precipitation. The manner of introducing silver iodide into clouds to reproduce most effective results, the effect of overseeding and the size of the area over which precipitation is increased by seeding are discussed. *Subject Headings:* **1. Artificial precipitation 2. Cloud seeding 3. Silver iodide.**—*I.L.D.*

3.3–74 551.509.67

Friggens, Paul, **Can the rain makers regulate the weather?** *Farm Journal,* March **1951.** p. 34–35, 100, 102, 103, 104. figs. **DA**—Efforts to make rain in the semiarid regions of the west are described and numerous instances of successful cloud seeding experiments by using silver iodide smoke are cited—especially the work done under contract by IRVING P. KRICK. Extravagant claims of some rain-making operators are repudiated and objections from those who claim excessive rain or diversion of rain from other areas is harmful, are counterbalanced by the ultra-conservative viewpoint of official organizations, making it appear that KRICK's position is rational and "scientific." *Subject Headings:* **1. Cloud seeding 2. Silver iodide 3. Western States 4. Krick, Irving P.**—*M.R.*

3.3–75 551.509.67

Langmuir, Irving, **Progress in cloud modification by Project Cirrus.** *General Electric Research Laboratory, Project Cirrus,* Final Report, Schenectady, July 30, **1951.** p. 204–217. 2 figs., 2 tables, 4 equations. **DWB**—Development of rain from cumulus clouds is attributed to heating effect following the forming of ice crystals. By artificially introducing ice into the cloud, the forming of ice crystals is claimed to be set off by a chain reaction, if the artificial seeding is done under a proper synoptic situation and with an adequate concentration of sublimation nuclei. Introducing high concentrations of ice nuclei (overseeding) is said to be best method to produce dissipation of large cumuli. Experiments by Project Cirrus in New

Mexico in 1948 and 1949 indicate that seeding increases the probability of rainfall. Statistical data presented *in extenso*. *Subject Headings:* **1. Cloud seeding 2. Artificial precipitation 3. New Mexico.**—*G. T.*

3.3–76 551.509.67

Langmuir, Irving, **Results of the seeding of cumulus clouds in New Mexico. A partial report on flight 45.** *General Electric Research Laboratory, Project Cirrus*, Final Report, Schenectady, July 30, 1951. p. 259–278. 8 figs., table. **DWB**—A brief discussion of the same subject was given by author in a paper presented before the American Meteorological Society on Jan. 5, 1949. The present report refers to a letter from Dr. Harry Wexler of the U. S. Weather Bureau, received by the author, and rejects the suggestion that the seeding under discussion had no obvious effect on the resulting rain, which would have occurred anyway. Eight photographs are added to the report on the flight which included one seeding with silver iodide and three with dry ice. *Subject Headings:* **1. Artificial precipitation 2. Cloud seeding 3. Cloud photographs 4. New Mexico. I. Wexler, Harry.**—*G.T.*

3.3–77 551.509.67

Langmuir, Irving, **Studies of tropical clouds.** *General Electric Research Laboratory, Project Cirrus*, Final Report, Schenectady, July 30, 1951. p. 279–295. **DWB**—Author found cloud formations in Honduras during the dry season to be particularly suited for seeding studies. Cooperating with Joe Silverthorne, of the United Fruit Company, he carried out several experiments using single ice pellets, water or carbon dioxide both for stimulating and preventing rainfall. Several new techniques were introduced and tried out. Particularly good results are claimed to have been obtained from seeding with single pellets which are reported to have modified clouds considerably. Motion pictures were made of unusual cloud formations and were used to study growth of cumulus when seeded or not seeded. Water scoop measurements made by plane are described. *Subject Headings:* **1. Artificial precipitation 2. Cloud seeding 3. Cloud photographs 4. Rainwater scoop measurement 5. Honduras.**—*G.T.*

3.3–78 551.509.67

Lewis, William, **The importance of artificial nucleation for the production of precipitation.** *New York Academy of Science, Transactions, 2nd Ser.*, 12(8):264–267, June 1950. **DLC**—The author criticizes the theory upon which is based the belief of the importance of artificial nucleation for producing rainfall. On the basis of a study of the formation of "altostratus" and "cumulonimbus" clouds he concludes that the existence of circulation patterns facilitating sufficient lifting for the production of precipitation will bring about a natural formation of ice crystals and the release of available moisture. *Subject Headings:* **1. Artificial precipitation 2. Condensation nuclei.**—*I.L.D.*

3.3–79 551.509.67 551.577.11

Mason, B. J., **Natural and artificial production of atmospheric precipitation.** *Nature*, London, 168(4274):533–534, Sept. 29, 1951. **DWB**—Summary of discussion at British Association, Edinburgh, Aug. 10, 1951, including contributions by B. J. Mason; F. H. Ludlam; R. F. Jones; A. B. Brewer and I. C. Browne. *Subject Headings:* **1. Artificial precipitation 2. Precipitation mechanism.**—*C.E.P.B.*

3.3–80 551.509.67

Pierson, Willard J., Jr., **Large scale control of weather by introduction of sublimation nuclei into the atmosphere.** *New York Academy of Sciences, Transactions, 2nd Ser.*, 12(8):268–270, June 1950. **DLC**—A critical discussion of several instances in which rainfall was produced presumably by seeding of clouds with AgI. A case (*Life*, Feb. 20, 1950) in which a cloud 25 miles away from the AgI generator gave rise to a full scale thunderstorm shows that surface and vertical wind velocity are such as to have prevented the AgI from reaching atmospheric levels where it could become effective. In the other instance, which involved rainmaking over New York State (April 25, 26, 1950), the air into which AgI was released was capped by an

inversion and the prevailing lapse rates would have prevented the AgI from reaching the freezing level where it becomes effective. *Subject Headings:* **1. Artificial precipitation 2. Cloud seeding 3. Silver iodide 4. New York.**—*I.L.D.*

3.3–81 551.509.67

Vollprecht, R., **Artificial rain.** *Weather*, 6(10):317, Oct. **1951.** **DWB**—Brief account of a shower caused by a scrub fire in Western Australia. *Subject Headings:* **1. Artificial precipitation 2. Fires 3. Western Australia.**—*C.E.P.B.*

# STRUCTURE AND PHYSICS OF THE ATMOSPHERE

## STRUCTURE OF THE ATMOSPHERE

(*See also items:* 3.3–140, 3.3–147)

3.3–82 551.510.41:551.508.95

†Effenberger, Ernst, **Die Bedeutung der Luftchemie für die Meteorologie und Medizin-Meteorologie.** [The importance of chemistry of the air for meteorology and medical meteorology.] *Annalen der Meteorologie*, 4(1–6):213–217, **1951.** 34 refs. German and English summaries p. 213. **MH-BH**—The proportions of the main constituents of the troposphere are practically constant but the solid, liquid, and gaseous admixtures vary. Gases occur as traces of ozone and nitrous gases, organic material, $CO_2$; industrial gases such as $SO_2$ and carbohydrates from petrol engines. Methods of determination are listed. *Subject Headings:* **1. Atmospheric composition 2. Air sampling and analysis.**—*C.E.P.B.*

3.3–83 551.510.41:551.510.53

Chackett, K. F.; Paneth, F. A.; Reasbeck, P. and Wiborg, B. S., **Variations in the chemical composition of stratosphere air.** *Nature*, London, 168(4270):358–360, Sept. 1, **1951.** table, 7 refs. **DLC**—Reports analyses of samples of air obtained in glass vials and steel bottles at heights of 50–72 km. Methods, sources of error, and corrected analyses discussed. *Subject Headings:* **1. Atmospheric composition 2. Air sampling and analysis 3. Stratosphere.**—*C.E.P.B.*

3.3–84 551.510.42:551.556.4

Förchtgott, Jiří, **Transport drobných částic nebo hmyzu přes Krušné hory.** [Transport of microparticles or insects over Krusné Hory (mountains).] *Meteorologické Zprávy*, 4(1–2):14–16, **1950.** 2 figs. **MH-BH**—The transport of foreign particles in the air is usually connected with mechanical turbulence rather than thermal turbulence. The mountain Krusné Hory with its sudden descent on the southeastern side from 800–1000 m to 200 m, creates mechanical turbulence in case of a strong northwesterly wind. With a wind of prolonged duration, the particles and insects are deposited in the valley of the river Ohřa, as shown on the attached charts. This is exactly the area where numerous and regular findings of potato beetles have been made by Engineer Skočdopole from the Institute for Plant Protection of the National Agricultural Research Institutes. *Subject Headings:* **1. Aerobiology 2. Lee waves 3. Disperse systems.**—*G.T.*

3.3–85 551.510.42:57

Polunin, Nicholas, **Arctic aerobiology. Pollen grains and other spores observed on sticky slides exposed in 1947.** *Nature*, London, 168(4278):718–721, Oct. 27, **1951.** 2 figs., table, 10 refs. **DWB**—Gives lists of pollen grains and fungal spores collected on 4 flights in Alberta and Northwest Territories. For one flight air mass trajectories are drawn. *Subject Headings:* **1. Aerobiology 2. Arctic.**—*C.E.P.B.*

3.3–86 551.510.42

Watson, H. H., **Alberta forest-fire smoke.** *Weather*, 6(8):253, Aug. **1951.** photo. **DWB**—Gives count of sizes of smoke particles (23,400/cc.) 200 miles from forest fire in Alberta, May 5, 1944. *Subject Headings:* **1. Atmospheric pollution 2. Smoke 3. Forest fires 4. Alberta, Canada.**—*C.E.P.B.*

## UPPER ATMOSPHERE—IONOSPHERE

3.3–87 551.510.5

Dewar, D., **Abrupt seasonal changes in tropopause level and stratosphere temperature at Habbaniya.** *Meteorological Magazine*, London, 80(953):323–326, Nov. 1951. 2 figs. **MH-BH**—Daily radiosonde ascents at Habbaniya 1948–1950 show an abrupt rise of tropopause in May or early June and descent in October, with a corresponding change from temperate to tropical regime. In transition periods tropopause is often double. *Subject Headings:* **1. Stratosphere 2. Tropopause height 3. Habbaniya, Iraq.**—*C.E.P.B.*

3.3–88 551.510.5:551.510.3

Robitzsch, Max, **Die relative Luftdichteänderung mit der Höhe, ein Luftmassendiagnostikum.** [The relative change of density with height, a diagnostic air mass property.] *Zeitschrift für Meteorologie*, 5(10):289–292, Oct. 1951. 2 figs. **MH-BH**—The relative change of air density with height, being independent of pressure, forms an index of the vertical structure of the atmosphere. Author gives a nomogram to determine it from virtual temperature and gradient of virtual temperature, and an example for Lindenberg up to 14 km showing ground layer, two air masses, substratosphere, and stratosphere. *Subject Headings:* **1. Air density 2. Atmospheric structure 3. Nomograms.**—*C.E.P.B.*

3.3–89 551.510.5:551.515.8

Schneider-Carius, Karl, **Die synoptische Bedeutung der Grundschicht.** [The synoptic importance of the ground layer.] *Annalen der Meteorologie*, 4(1–6):150–157, 1951. 7 figs., 4 refs. **MH-BH**—A discussion of various facts about the lowest 1–2 km. (1) The ground layer as a region of ageostrophic compensation currents between high and low pressure. (2) The life history of the ground layer (fronts, convection, etc.; air mass analysis). (3) Changes of air mass (active warm fronts, cold fronts of different types, occlusions). Illustrated with sections showing sequences of cloud forms. *Subject Headings:* **1. Atmospheric structure 2. Fronts.**—*C.E.P.B.*

3.3–90 551.510.53:551.513

†Clarkson, L. S., **Evidence for a stratospheric circulation in vertical meridional planes between polar and equatorial regions in winter.** *Meteorological Magazine*, London, 80(953): 309–318, Nov. 1951. 5 figs., 23 refs. **MH-BH**—Author discusses recent cross sections from Arctic to Antarctic. Tropopause at equator is lower and warmer in July than January. In Antarctic, troposphere is much colder than in Arctic especially in summer. As causes, greater extent of oceans and greater cloudiness are inadequate and transport of ozone is adopted as main cause. This leads to a unified scheme of stratospheric circulation, consisting of a descent at equator, flow in lower stratosphere from equator to pole, ascent at pole and return flow at greater heights. In winter this circulation is stronger in the Southern than in Northern Hemisphere. This is consistent with GOLDIE's reconstruction. *Subject Headings:* **1. Stratosphere 2. Meridional circulation 3. Tropopause.**—*C.E.P.B.*

3.3–91 551.510.534:551.510.535

Fritz, Sigmund, **Ozone measurements during sudden ionospheric disturbances.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:343–350, 1951. 7 refs., 4 figs., 2 equations. English, German and French summaries p. 343. **DWB**—Ozone amounts on days with sudden ionospheric disturbances were examined by measurements on 3110 Å and 3300 Å. No appreciable change in the ratio of these was observed. *Subject Headings:* **1. Ozone variations 2. Ionospheric disturbances.**—*C.E.P.B.*

3.3–92 551.510.535 551.508.96

Berning, Warren W., **Charge densities in the ionosphere from radio Doppler data.** *Journal of Meteorology*, 8(3):175–181, June 1951. 5 figs., table, 6 refs., 14 equations. **DWB**—A brief description of the DOVAP (Döppler velocity and position) instrumentation and of the principles underlying its operation. The theoretical principles underlying the determination of ionospheric structure from errors in DOVAP data reductions are discussed and an equation is developed which enables the determination of ionization densities from DVOAP records if the

true radial velocity of a missile is known along the trajectory. Numerical data on densities of the D, E, and F2 layers are given. *Subject Headings:* **1. Ionization densities 2. Ionospheric structure 3. Ionospheric records 4. DOVAP instrumentation.**—*I.L.D.*

3.3–93 551.510.535

Burkard, Otto, **Die Erforschung der Ionosphäre.** [The investigation of the ionosphere.] *Naturwissenschaftliche Rundschau*, 4(10):419–423, Oct. **1951.** 3 figs. **DWB**—A summary of the structure of the ionosphere, ionization of E ($10^{10}$ ions/cc.) and F ($10^{6}$ electrons/cc.) layers, and origin of E layer by ionizing solar radiation. Origin of F layers not yet fully explained; their critical frequency closely follows sunspot number. Relations to air mass type discussed. *Subject Heading:* **1. Ionosphere.**—*C.E.P.B.*

3.3–94 551.510.535

Burkard, Otto, **Die halbjährige Periode der $F_2$-Schicht-Ionisation.** [The half-yearly period of the F2 layer ionization.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:391–402, **1951.** 7 figs., 2 tables, 6 refs. German, English and French summaries p. 391. **DWB**—Harmonic analysis of F2 layer ionization at numerous stations shows a strong half-year periodicity. Latitude distribution of phase and amplitude are discussed. The variation is provisionally explained by the assumption that solar UV radiation varies with latitude. *Subject Headings:* **1. Ionosphere 2. F2 layer 3. Periodicities.**—*C.E.P.B.*

3.3–95 551.510.535:551.513

Lauter, Ernst August, **D-Schicht Beobachtungen und allgemeine Zirkulation.** [Observations of the D layer and the general circulation.] *Annalen der Meteorologie*, 4(1–6):136–138, **1951.** 4 figs., 7 refs. **MH-BH**—Damping by the D-layer shows an annual variation, investigated at Wahnsdorf on 245 KHz, checked on 48 KHz. Five-day departures of damping from smoothed monthly means have a correlation of +0.59 with mean gradient of 500 mb surface 40–65°N between 20°W and 40°E. *Subject Headings:* **1. D layer 2. Zonal circulation.** —*C.E.P.B.*

3.3–96 551.510.535:621.396.11

Whale, H. A. and Stanley, J. P., **Group and phase velocities from the magneto-ionic theory.** *Journal of Atmospheric and Terrestrial Physics*, 1(2):82–94, **1950.** 11 figs., 11 refs., 19 equations. **MH-BH**—Calculations of group velocity are made at Cambridge with an electronic computer (EPSAC) and curves presented to show visually the behavior of radio waves passing through an ionized medium, under a variety of conditions. The ordinary No-field case, the Ordinary Component and the Extraordinary Component are considered separately. Three dimensional models are drawn to show the dependence of curves on the value of $y$. The effect of varying direction of propagation angle and of wave length is also shown graphically. *Subject Headings:* **1. Radio waves 2. Group wave velocity 3. Ionosphere.**—*M.R.*

## MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

(*See also item:* 3.3–112)

3.3–97 551.511:551.513.1:532.5

Chicago. University. Department of Meteorology, **Research on experimental hydrodynamics in relation to large-scale meteorological phenomena.** *Contract AF 19(122)–160, Progress Report* No. 6 and 7, July **1951.** 8 p. **DWB**—Observations of the internal motions in a rotating fluid by means of the "dishpan apparatus." The apparatus was modified to permit use of a glass cylinder to study motions around an obstacle, motions when cylinder is heated, etc. Speed and direction of flow were varied. Movies and slides were prepared and motions in a rotating spherical shell studied. *Subject Headings:* **1. Hydrodynamics 2. Mechanics of the atmosphere 3. Rotating spherical shells. I. Contract AF 19(122)–160. II. Long, Robert R.**—*M.R.*

3.3–98 551.511

Faust, Heinrich, **Änderungen der Relativen Topographie durch Vertikalbewegungen.** [Changes of the relative topography by vertical movements.] *Zeitschrift für Meteorologie*, 4(12):356–359, Dec. **1950.** fig., 3 tables. **MH-BH**—A total of 1638 radiosonde ascents in Europe were used to find the mean 24-hour temperature changes at 850–225 mb in cyclonic (rising) and anticyclonic (sinking) air, over land and sea, year, summer and winter. From these the changes in the relative topography 1000–500 mb were calculated. For deep systems the calculations are extended to the 4th day. These convective changes are appreciable and the tables give means of estimating them. *Subject Headings:* **1. Relative topography 2. Differential kinematics 3. Radiosonde ascents 4. Dynamics of the atmosphere 5. Europe.**—*C.E.P.B.*

3.3–99 551.511

Hashimoto, M., **On the stream lines of the two vertical sections when the thermal convective pattern is a regular and symmetrical hexagon.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(2):44–53, Feb. **1951.** 3 figs., 8 refs., 13 equations. In Japanese, English summary p. 52. **MH-BH**—A mathematical study of convection in hexagonal cells, which are the characteristic regime of an unlimited horizontal layer. *Subject Heading:* **1. Convection.**—*C.E.P.B.*

3.3–100 551.511

Hesselberg, Th., **Mean transport in the atmosphere.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:128–141, **1951.** 5 tables, 28 equations, 4 refs. English, German and French summaries p. 128. **DWB**—Hourly values of pressure, temperature, humidity and wind at Aas (Norway) in Jan. and Oct. 1929 were used to calculate fluxes of volume, mass, specific momentum, kinetic energy, heat, and water vapor, separately for transport by mean wind and by eddies (table 3 and in units of energy, table 6). The ratios of these two vary widely; causes of differences are discussed. Various applications of the results to problems of general circulation and turbulence are considered. *Subject Headings:* **1. Energy transport 2. Turbulence.**—*C.E.P.B.*

3.3–101 551.511

Jordán, Plácido, **On motion with constant relative vorticity.** *Journal of Meteorology*, 8(3):199, June **1951.** 5 equations. **DWB**—The author derives an expression called "critical meridional acceleration" which has the dimensions of acceleration and is a function of the latitude and the meridional component of the velocity. From this equation rules are derived for a particle moving with constant relative velocity. *Subject Headings:* **1. Vorticity theory 2. Meridional circulation.**—*I.L.D.*

3.3–102 551.511:551.543

†Kertz, Walter, **Theorie der gezeitenartigen Luftschwingungen als Eigenwertproblem.** [Theory of tide-like atmospheric oscillations as a single-value problem.] *Annalen der Meteorologie, Beiheft*, **1951.** 31 p. 3 figs., 3 tables, 73 refs., 105 equations. German and English summaries p. 1. **MH-BH**—"The equations of motion in an autobarotropic atmosphere on an earth with surface irregularities are formulated and expressed, by means of operators, in terms of a linear eigen-value problem. Starting from the solutions for a nonrotating earth with smooth surface, the theory of perturbations is applied to find the deviations produced by the earth's rotation and by an obstacle corresponding to the Cordilleras in western America. The comparison of observational results on tidal atmospheric oscillations with theory shows qualitative agreement." *Subject Heading:* **1. Pressure oscillations.**—*Author's abstract.*

3.3–103 551.511

McIntyre, D. P., **The philosophy of the Chicago School of Meteorology.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:24–32, **1951.** 11 refs., 2 equations. English, German and French summaries p. 24. **DWB**—The "Chicago School" founded by Rossby deals mainly with large-scale features of the atmosphere which are important aspects

of the general circulation (e.g., energy transmission) as hydrodynamical problems in which the investigation of wind rather than pressure is fundamental. Concepts introduced by the School—group velocity, horizontal mixing, indirect circulation—are defined. *Subject Headings:* **1. Hydrodynamics 2. Atmospheric circulation 3. Rossby, Carl-Gustav 4. Chicago. University, Dept. of Meteorology.**—*C.E.P.B.*

3.3–104 551.511

Van Mieghem, Jacques, **La turbulence isentropique latérale dans le tourbillon circulaire.** [Isentropic lateral turbulence in a circular eddy.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:33–40, **1951.** 7 refs., 13 equations. French, German and English summaries p. 33. **DWB**—A highly mathematical paper in which isentropic lateral mixing or *Gleitaustausch* is studied as a transverse eddy exchange. REYNOLD's tensor and the rate of production of kinetic energy of turbulence are investigated. The equations derived are applied to horizontal turbulence in a vertical whirl. *Subject Heading:* **1. Turbulence theory.**—*C.E.P.B.*

3.3–105 551.511:551.543.1

Wilkes, M. V., **The thermal excitation of atmospheric oscillations.** *Royal Society of London, Proceedings, Ser. A*, 207:358–370, **1951.** 7 refs., 53 equations. **DWB**—A mathematical treatment of the thermal excitation of large-scale forced oscillations in a rotating atmosphere in which temperature is assumed to vary arbitrarily with height. This is applied to an atmosphere periodically heated by conduction from the ground, and to periodic heating and cooling in a region not in contact with the ground. Numerical results for the solar semidiurnal oscillation do not conflict with CHAPMAN's (1924) hypothesis that the thermal and gravitional contributions are of the same order of magnitude. *Subject Headings:* **1. Pressure oscillations 2. Thermodynamics of the atmosphere.**—*C.E.P.B.*

## GENERAL CIRCULATION

(*See also items:* 3.3–90, 3.3–95, 3.3–97, 3.3–211)

3.3–106 551.513:551.557

Defant, Friedrich, **Die Änderungen des meridionalen Windprofils durch Kondensationswärme und Turbulenzvorgänge.** [The changes of the meridional wind profile by heat of condensation and by turbulence processes.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:156–175, **1951.** 8 figs., table, 6 refs., 5 equations. German summary p. 173–174, English and French p. 156. **DWB**—The wind profile depends on a number of variables involving pressure, temperature, and heat. Author examines the effect of changing individual factors: 1) vertical exchange coefficient; 2) mean rainfall over the earth as a whole (affecting decrease of temperature with height); 3) horizontal meridional exchange coefficient and 4) meridional distribution of precipitation. He calculates resulting meridional temperature and wind profiles. The effects on the development of the jet stream are discussed; the heat of condensation resulting from zonal distribution of precipitation appears to be the dominant factor. *Subject Headings:* **1. Atmospheric circulation 2. Thermodynamics of the atmosphere 3. Jet stream 4. Wind profiles 5. Turbulence.**—*C.E.P.B.*

3.3–107 551.513:551.581

Flohn, Hermann, **Allgemeine Zirkulation und natürliche Klimaeinteilung.** [General circulation and natural distribution of climate.] *Annalen der Meteorologie*, 4(1–6):76–77, **1951. MH-BH**—A brief summary of two papers by the author (*Bericht des Deutschen Wetterdiensts, U. S. Zone*, Nr. 18, 1950 and *Erdkunde*, 1950, p. 141–162). The planetary and monsoon circulations cause 8 climatic zones. *Subject Headings:* **1. Dynamic climatology 2. Climatic zones.**—*C.E.P.B.*

3.3–108 551.513(98/9)

Flohn, Hermann, **Die Zirkulation der Atmosphäre in den Polargebieten.** [The circulation of the atmosphere in the polar regions.] *Polarforschung*, 3(1):58–64, **1951.** fig., 2 tables,

10 refs. **DWB** —A summary of results of recent abundant data from polar regions. Most important is the discovery of a cold pole in the free troposphere in about 75°N, 80°W which governs circulation up to 100 mb, and a secondary pole over Alaska. There is probably a similar but weaker asymmetry over the Antarctic. Polar temperatures are tabulated up to 21 km. A possible connection between tropospheric asymmetry and magnetic poles is mentioned. Troposphere is colder in Antarctic than Arctic, due to weaker meridional exchange. Polar stratosphere temperature, glacial anticyclone and glacial inversion are briefly discussed. *Subject Headings:* **1. Atmospheric circulation 2. "Cold pole" 3. Troposphere 4. Antarctic 5. Arctic.**—*C.E.P.B.*

3.3–109 551.513:551.589

Murakami, T., **On the study of the change of the upper westerlies in the last stage of Baiu Season (Rainy season in Japan).** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(5):162–175, May 1951. 15 figs., 3 tables. In Japanese, English summary p. 175. **MH-BH**—A study illustrated by time sections of 700 mb level, vertical sections and isohypses for 300, 500, and 700 mb, of the jet streams over Japan in June 25–July 25, 1950. During the bai-u the jet stream is double in 140°E, branches in 35° and 60°N. At the end of the bai-u, about mid-July, a "cut off low" appears over Japan and the southern branch of the jet stream ceases abruptly (*see* fig. 5). *Subject Headings:* **1. Jet stream 2. Bai-u 3. Japan.**—*C.E.P.B.*

3.3–110 551.513

Raethjen, Paul, **Das planetarische Zirkulationssystem.** [The planetary circulation system.] *Annalen der Meteorologie*, 4(1–6):65–75, 1951. 5 figs., table, 7 refs., 4 equations. German and English summaries p. 65. **MH-BH**—Author separates the planetary and monsoon-like parts of the general circulation. Fig. 1 shows for 90°N–90°S, for Jan. and July, pressure at 250 gdm, and its monsoon component, gradient, % land, and roughness parameter. The monsoon component is charted. The planetary circulation in winter and summer up to 25 km is schematically shown by a meridional section. Author describes a weak but permanent "tropopause circulation," polewards in lower stratosphere, equatorwards below. Finally, the dynamics and kinematics of polar front instability are modelled and the bearing of the author's ideas on weather forecasting considered. *Subject Headings:* **1. Atmospheric circulation 2. Planetary circulation 3. Tropopause.**—*C.E.P.B.*

3.3–111 551.513

Raethjen, Paul, **Über den planetarischen Austausch der Vorticity und des Rotationsmoments.** [On the planetary exchange of vorticity and of the moment of rotation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:41–52, 1951. 8 refs., 21 equations. German, English and French summaries p. 41–42. **DWB**—After a brief discussion of theories of the maintenance of the atmospheric circulation from FERREL to ROSSBY, author discusses meridional flux of vorticity and the exchange of momentum. Equilibrium above 4 km is explained by the evident facts that while the poleward flowing west wind impulse due to the angular momentum increases the absolute vorticity of the polar regions, the transport of vorticity towards the equator diminishes it. He defines a polar zone of isotropic impulse exchange separated from the west wind zone by a "planetary polar front" in which his "coefficient of monotropy" (*see item* No. 2.10–67 Oct. 1951 *Meteorological Abstracts*) is zero. *Subject Headings:* **1. Atmospheric circulation 2. Vorticity 3. Polar fronts.**—*C.E.P.B.*

3.3–112 551.513.1:551.511

Arakawa, Hidetoshi, **Tropopause in a steady zonal wind field.** *Meteorological Society of Japan, Journal, 2nd. Ser.*, 29(3):86–89, March 1951. 2 refs., 6 equations. In English, English and Japanese summaries 86–87, 89. **MH-BH**—The equations of a steady zonal wind are solved, giving continuous nearly straight isobars with a slope at the tropopause steeper than those of neighboring isobaric surfaces in temperate latitudes. Above this the meridional temperature gradient changes direction. Jet streams are most probable near the tropopause in the westerlies; north of this the tropopause dips. *Subject Headings:* **1. Jet stream 2. Tropopause.**—*C.E.P.B.*

3.3–113 551.513.1:551.557.2

Yeh, Tu-cheng, **On the maintenance of zonal circulation in the atmosphere.** *Journal of Meteorology*, 8(3):146–150, June **1951.** 3 tables, 13 refs., 7 equations. **DWB**—The existence of a jet stream around the earth requires vorticity transport from regions of anticyclonic vorticity found in low latitudes to regions of cyclonic vorticity in high latitudes. Equations, representing the transfer of vorticity, are presented In low latitudes meridional and large horizontal vortical systems are equally effective in transporting vorticity from low to high latitudes; in middle latitudes the large horizontal vortical systems are more efficient; in high latitudes the role of the mean circulation in maintaining the zonal circulation is negligible. These conclusions are based upon numerical examples. *Subject Headings:* **1. Zonal circulation 2. Jet stream 3. Vorticity equations.**—*I.L.D.*

3.3–114 551.513.7:551.509.33

Cappel, Albert, **Kritische Betrachtung einiger Weltkorrelationen.** [Critical consideration of some world correlations.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:263–271, **1951.** 5 tables, 12 refs. German, English and French summaries p. 263. **DWB**—A number of correlations between temperature at Prague in Jan. and July and preceding temperatures in all parts of the world, obtained by Pollak with data 1887–1916, are recalculated for 1911–40. Nearly all changed greatly. Such relations therefore cannot be used for forecasting until their stability has been confirmed. *Subject Headings:* **1. Correlations 2. Extended forecasting.**—*C.E.P.B.*

## ATMOSPHERIC DISTURBANCES

(*See also items:* 3.3–57, 3.3–65, 3.3–69, 3.3–89, 3.3–252)

3.3–115 551.515:551.576.11(265)

Bryson, Reid A., **Studies on the weather of the tropical west Pacific by means of the cloudiform stability scale.** *American Meteorological Society, Bulletin*, 32(5):174–182, May **1951.** 20 figs., 3 tables, 6 refs. **MH-BH**—The cloudiform stability scale is an objective scale for classifying the degrees of instability represented by the various types of cumuliform clouds over tropical regions. The diurnal cloud variations over the Marianas are described and patterns of cloudiform variations associated with the primary circulation, equatorial form, polar troughs, and easterly waves are discussed. *Subject Headings:* **1. Atmospheric disturbances 2. Cloud variations 3. Tropical Pacific.**—*I.L.D.*

3.3–116 551.515(265)

§Gray, L. A., **A brief report on the effect of tropical disturbances in the Korea operational area.** *U. S. Air Force, 2143D Air Weather Wing, Technical Bulletin*, 1(7):36–42, June **1951.** charts. **DWB**—The author describes the characteristics of the small vortices of tropical origin which occur commonly in the ocean area south of the Japanese Islands. Ways of forecasting them are discussed. A specific instance of the behavior of these disturbances is presented. *Subject Headings:* **1. Tropical cyclones 2. Tropical squalls 3. Western Pacific.**—*I.L.D.*

3.3–117 551.515.1

Kleinschmidt, Ernst, jun., **Untersuchung eines Tropopausentrichters mit Hilfe der ERTELschen Wirbelinvarianten Z.** [Investigation of a depression in the tropopause by means of ERTEL's whirl-invariant Z.] *Annalen der Meteorologie*, 4(1–6):131–132, **1951. MH-BH**—Summary and discussion of a paper "Über Aufbau und Entstehung von Zyklonen III," [On the origin and development of cyclones] in *Meteorologische Rundschau*, 4(5–6):89–96, May–June 1951. (*See item* No. 3.1–93 in Jan. 1952 *Meteorological Abstracts.*) *Subject Headings:* **1. Cyclone structure 2. Tropopause.**—*C.E.P.B.*

3.3–118 551.515.11

§Liu, Kwang-nan, **The formation of an upper vortex over Japan and its relation to the deepening of an Asiatic cyclone.** *Chinese Geophysical Society, Journal*, 2(2):217–228, Dec.

1950. charts, 11 refs. In English, Chinese summary p. 217. **MH-BH**—Closed vortices in upper air are frequent over China. A case on Oct. 1–7, 1950 is illustrated, in which, with a depression over Siberia, a trough at 500 mb level between two ridges deepened rapidly and moved east. Vertical structure shown. The general deepening of cyclones crossing China coast is discussed; it is probably connected with the prevailing vorticity along coast. *Subject Heading:* **1. Cyclogenesis.**—*C.E.P.B.*

3.3–119 551.515.11

Watanabe, T., **Dynamical studies of the atmospheric pressure variation.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(2):53–59, Feb. **1951.** 7 figs. In Japanese, English summary p. 59. **MH-BH**—The motion of individual air particles in a concentric cyclone is studied and illustrated. The mechanism of pressure variation is discussed in terms of accumulation of vorticity, convergence and divergence, vertical stability, etc. This is a non-mathematical abstract of a paper to be published in full later. *Subject Headings:* **1. Cyclone dynamics 2. Pressure variations.**—*C.E.P.B.*

3.3–120 551.515.13(74)

Bristor, Charles L., **The great storm of November, 1950.** *Weatherwise*, 4(1):10–16, Feb. **1951.** 8 figs. **MH-BH**—The author describes the meteorological events, the synoptic situation and the situation the forecaster had to predict, and compares the forecast with the actual events. *Subject Headings:* **1. Snowstorms 2. Eastern United States.**—*I.L.D.*

3.3–121 551.513:523.73(261)

Pollak, Leo Wenzel and Tedde, P. G., **On the frequency of cyclones over the North Atlantic related to the sunspot cycle.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:98–111, **1951.** 7 figs., 5 tables, 8 equations. English, German and French summaries p. 98–101. **DWB**—Authors tabulated annual frequency of cyclone centers by 5° squares over North America and North Atlantic 1899–1932 (means shown; full data in *Dublin Institute of Advanced Studies, School of Cosmic Physics, Geophysical Bulletin*, Nr. 3). Movements of three belts of maxima over North Atlantic show probable but ambiguous relations to sunspot cycle. KULLMER's results for North America (1943) confirmed. *Subject Headings:* **1. Depressions 2. Sunspot cycles 3. North Atlantic Ocean.**—*C.E.P.B.*

3.3–122 551.515.3(492)

§Delver, A., **De windhozen van 23 Augustus 1950.** [The tornado of Aug. 1950.] *Hemel en Dampkring*, 49(7/8, 9):121–129, 148–157, **1951.** 18 figs. **DLC**—The tornado developed under a Cu. cloud associated with a cold front. Charts and photographs show path of storm, places where damage was reported, synoptic conditions, isohyets, etc. from time of first reported damage in extreme SW Holland (16:00) to last report in extreme NE (>19:15). At De Bilt between 17:12 and 17:23 about 25 mm of rain fell. Barograms showed a fall followed by a short sharp rise. The structure of the "microfront" is analyzed with diagrams. *Subject Headings:* **1. Tornadoes 2. Netherlands.**—*M.R.*

3.3–123 551.515.3

Tepper, Morris, **The Tornado and Severe Storm Project.** *Weatherwise*, 4(3):51–53, June **1951.** 4 figs. **MH-BH**—The stations utilized are shown on a map. The basic instrument is a modified Priez microbarograph. Data for testing the pressure jump hypothesis for the origin of tornadoes will be gathered. *Subject Headings:* **1. Tornado and Severe Storm Project 2. Tornado research. I. U. S. Weather Bureau.**—*I.L.D.*

3.3–124 551.515.31

§Bleeker, Wouter and Delver, A., **Some new ideas on the formation of windspouts and tornadoes.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:220–237, 1951. 8 figs., 17 refs. English, German and French summaries p. 220–221. **DWB**—The essential problem is the central up-current, which may be due to differential surface heating, as in dust devils, fire tornadoes and weak spouts, but violent CuNb spouts are attributed to

cooling of the neighboring air by precipitation. Previous theories are discussed, then the precipitation theory is supported by reference to 295 spouts. The violent occurrence in Holland on Aug. 23, 1950 is examined in detail with synoptic charts. Throughout its existence the main spout was more or less surrounded by precipitation. *Subject Headings:* **1. Whirlwinds 2. Netherlands.**—*C.E.P.B.*

3.3–125 551.515.31

Brandejs, Stanislav, **Theorém vírnatosti.** [Theory of tornado formation.] *Meteorologické Zprávy*, 4(1–2):7–8, **1950.** 4 figs., 7 equations. **MH-BH**—The exact mathematical formulas connected with tornado formation are given, among others, by J. Holmboe in his "Dynamic Meteorology" (Chap. 11). A very simple model is explained by H. Byers ("General Meteorology," Chap. XVI). This article gives a summary of Byers' deductions and a few hints on the practical conclusions resulting from the theory of tornado formation. The working elements are geographic latitude, convergence and divergence, the effect of which elements on cyclonic and anticyclonic tornadoes is determined through various mathematical formulas, including the Rossby formula. *Subject Headings:* **1. Tornado dynamics 2. Tornado formation.**—*G.T.*

3.3–126 551.515.31

Koschmieder, Harald, **Zur Trombenbildung.** [On tornodo formation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:203–219, **1951.** 9 figs., 24 refs. German, English and French summaries p. 203–204. **DWB**—Dust devils and tornadoes are roughly classified as due to eddying warm air over lava and volcanoes, disturbances of field of flow by buildings, squall cloud tornadoes and American tornadoes (integration of whirls by earth's rotation). Greatest pressure deficit about 50 mb in Europe but exceeds 100 mb in America. The causes of this deficit are probably dynamic, due to inertia of rotating air. An appendix on two dust whirls at Bremen June 17, 1950, gives hints on evaluation of photos. *Subject Headings:* **1. Dust devils 2. Tornadoes 3. Whirlwinds.**—*C.E.P.B.*

3.3–127 551.515.31

Rossmann, Fritz, **Über Wolkentromben.** [On cloud spouts.] *Annalen der Meteorologie*, 4(1–6):48–55, **1951.** 7 figs., 17 refs. **MH-BH**—The question whether air rises or descends in the core of a tornado is discussed, and the shape of the core in a vertical wind gradient determined for each case. Comparison with photos of tornadoes shows that the air is descending in the core. Over a water surface the divergent rising air at the base throws up a girdle of spray. *Subject Heading:* **1. Tornado dynamics.**—*C.E.P.B.*

3.3–128 551.515.8:551.588.2(23)

Tadeuchi, M., **On the influence of mountain ranges on the cold front and masked phenomena of cold air masses.** *Papers in Meteorology and Geophysics*, Tokyo, 2(1):30–39, March **1951.** 12 figs., 5 refs. **MH-BH**—A study of the cold fronts that passed over Nagano and its vicinity during Jan.–Dec. 1946. The author discusses cases: 1) in which air on the lee side of mountain ranges is colder than in the rear of the cold front, the front does not overrun because of the occurrence of föhn and 2) in which overruning occurs in the absence of föhn. *Subject Headings:* **1. Cold fronts 2. Orographic influences 3. Nagano, Japan.**—*I.L.D.*

3.3–129 551.515.83

Schumann, Theodor Eberhardt Werner and van Rooy, M. P., **Frequency of fronts in the Northern Hemisphere.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:87–97, **1951.** 5 figs., 4 tables, 4 refs. English, German and French summaries p. 87. **DWB**—From "Historical Weather Maps 1928–38," authors tabulated % numbers of fronts per unit area (5° square at equator) for all Northern Hemisphere except USSR for winter and summer. Results shown in tables and charts. Mean values for each 5° lat. compared with values computed from regression equations on pressure and temperature gradients. *Subject Headings:* **1. Fronts 2. Statistical studies 3. Northern Hemisphere.**—*C.E.P.B.*

# RADIATION AND TEMPERATURE

## RADIATION

(*See also items:* 3.3–44, 3.3–45, 3.3–258)

3.3–130 551.521.14

Feĭgel'son, E. M., **Radiatsionnye svoĭstva oblakov St.** [Radiation characteristics of stratus clouds.] *Akademiia Nauk, SSSR, Izvestiia, Seriia Geofiz.*, No. 4:92–117, July–Aug. **1951.** 9 figs., 10 tables, 14 refs., 40 equations. **DLC**—The approximate equations for transfer of radiant energy in clouds, using a nonspherical index of scattering, are used to set up tables and curves for albedo of the cloud surface under varying angles of incident radiation, the transmission coefficients for direct and diffuse radiation, the variation with height of the long wave radiation in a cloud, etc. Work is based on previous work of the author and recent work of Albrecht, Neiburger, Stratton and Houghton, aufm Kampe, and others. Numerous tables of coefficients are given. *Subject Headings:* **1. Albedo of clouds 2. Atmospheric absorption 3. Stratus clouds 4. Tables.**—*M.R.*

3.3–131 551.521.14:771:535.243

†*Krinov, E. L., **Spektral'naia otrazhatel'naia sposobnost' prirodnykh obrazovaniĭ.** [Spectral reflective properties of natural surfaces.] Moscow, Akademiia Nauk, **1947.** 270 p. 177 figs., 15 tables, 45 refs., append. 70 p., tables. **DLC**—Results of 370 spectrophotometric measurements of albedo of all possible types of natural surfaces are analyzed with basic data listed and curves of intensity in wave lengths from .4–.9$\mu$ for each observation systematically presented. Among the types of surface covered are forest (birch, oak, fir, willow, linden, pine, elm, larch), grasses, tundra, orchards, gardens, snow cover, buildings, etc. Not only are various types of each of the above surfaces analyzed, but variation in each type, according to season, homogeneity, stage development, etc. are treated separately. The textual section treats of the theory of spectrophotometry, methods of observation, details of instrumentation for use in aerial photography of albedo and methods of compiling data. Spectrophotometric observations were made in nine regions of the European USSR from Arctic to subtropics (including tundra, taiga, chernozem, forested steppe, steppe, desert and mountain areas) between 1932 and 1942. A total of 905 reels and 10,316 spectrograms were obtained and analyzed, constituting one of the most worthwhile contributions in this field from a practical and a theoretical standpoint. Not only does it enable the calculation of the albedo of the earth from a knowledge of astronomical and vegetative factors, but would facilitate the selection of proper filters for aerial photography. Cloud albedo is not, however, considered. *Subject Headings:* **1. Albedo of earth 2. Spectrophotometry 3. Aerial photography 4. U.S.S.R.**—*M.R.*

3.3–132 551.521.3:536.33

Callomon, H. J.; McKean, D. C. and Thompson, H. W., **Intensities of vibration bands III. Nitrous oxide.** *Royal Society of London, Proceedings, A*, 208:332–341, **1951.** 6 figs., 2 tables. **DWB**—A description and discussion of experimental determination of the vibration-absorption band of nitrous oxide at 4.5$\mu$. Pressure-broadening relationships are discussed. *Subject Headings:* **1. Atmospheric absorption 2. Nitrogen compounds.**—*C.E.P.B.*

3.3–133 551.521.3

Kuznetsov, E. S., **Obshchiĭ metod postroeniia priblishennykh uravneniĭ perenosa luchistoĭ energii.** [General method of setting up approximate equations for transfer of radiative energy.] *Akademiia Nauk, SSSR, Izvestiia, Seriia Geofiz.*, No. 4:71–91, July–Aug. **1951.** 2 figs., table, 8 refs., 81 equations. **DLC**—A long, theoretical paper developing the approximate equations for transfer of radiant energy depending on boundary conditions and on the index of scattering and, finally, applying the theory to a specific case, with given solar angle, albedo of earth's surface and optical density of the atmosphere. The curves and tables for calculated sky brightness and scattering of the first order at various angles are compared with observed values. Other functions are also shown. *Subject Headings:* **1. Sky brightness 2. Scattering of light 3. Energy equations.**—*M.R.*

3.3–134 551.521.3:536.33

Thompson, H. W. and Williams, R. L., **Vibration-rotation bands of nitrous oxide.** *Royal Society of London, Proceedings, A*, 208:326–331, **1951.** 3 figs., table, 8 refs. **DWB**—Examination of the absorption by nitrous oxide near 4.5 $\mu$ showed two overlapping bands, the rotational fine structure of which is analyzed theoretically. *Subject Headings:* **1. Atmospheric absorption 2. Nitrogen compounds.**—*C.E.P.B.*

3.3–135 551.521.3:551.593.54

Wempe, J., **Die Wellenlängenabhängigkeit der atmosphärischen Extinktion.** [The dependence of atmospheric extinction on wave length.] *Potsdam, Astrophysikalisches Observatorium, Mitteilungen*, Nr. 21, *Astronomische Nachrichtungen*, 275:1–22, **1947.** 4 figs., 10 tables, 42 refs.—Monochromatic extinction coefficients were measured on two stars in Jena under a variety of atmospheric conditions for wave lengths $\lambda = 0.4$–$0.7\,\mu$. The components were separated into Rayleigh molecular scattering, selective absorption by ozone, and the residue due to haze extinction. The latter term is expressed in the form $\beta/\lambda^{\alpha}$ where $\beta$ depends on haze conditions and $\alpha$ is nearly constant at 1.5. A similar analysis is applied to observations at other low-level and at mountain observatories giving values of $\alpha$ ranging from 0.5 to 1.9 almost independent of height, but due to local differences in the nature of the haze. *Subject Headings:* **1. Extinction coefficients 2. Haze.**—*C.E.P.B.*

3.3–136 551.521.32:551.584

Czepa, O., **Über die nächtliche Abkühlung der Erdoberfläche und der bodennahen Luftschicht.** [On the nocturnal cooling of the earth's surface and of the layer of air near the ground.] *Zeitschrift für Meteorologie*, 4(12):359–362, Dec. **1950.** 2 tables, 11 refs., 4 equations. **MH-BH**—Summarizes recent literature on the nocturnal heat economy of the earth's surface. During the night the effective out-radiation usually falls by only 12–15% of its evening value; BRUNT's rule that nocturnal cooling is proportional to sq root of time is found to hold, the proportionality factor depending on wind speed. ÅNGSTRÖM's formula recalculated by BOLZ and FALCKENBERG also applies, and several other formulas are discussed. *Subject Headings:* **1. Nocturnal cooling 2. Terrestrial radiation 3. Micrometeorology.**—*C.E.P.B.*

3.3–137 551.521.4

Brown, Geoffrey M., **The airglow.** *Science Progress*, London, 39(156):623–639, Oct. **1951.** 3 tables, refs. **DLC** Airglow (=light of the night sky=non-polar or permanent aurora) accounts for 40% of residual sky light. It is nonpolarized and due to self-emission from excited constituents of the upper atmosphere. Spectrum is described and origin of the bands discussed. Intensity varies, especially during morning and evening twilight due to direct absorption of solar radiation. Altitude uncertain but may be below 120 km. Theories of origin discussed are atomic recombination, ionized layer recombination, and incident particles. *Subject Heading:* **1. Light of the night sky.**—*C.E.P.B.*

3.3–138 551.521.61

Gaertner, H., **Die Durchlässigkeit der getrübten Atmosphäre für ultrarote Strahlen.** [The transparency of the hazy atmosphere for infrared rays.] *Verein Deutscher Ingenieure, Zeitschrift*, Berlin, 93(5):113–117, Feb. 11, **1951.** 8 figs., 12 refs. **DLC** Author discusses theory of scattering and shows that transmission depends on relation between wave-length and particle diameter. In dense natural fog, infrared radiation below 10 mu is absent. In haze or light mist "visibility" on 2–3 mu is 4 times that in visible wave length. He then describes spectral range of various photocells, a telephoto theodolite effective up to 90 km distance with accuracy 25 m, and a telephoto camera giving minute detail at 35 km. *Subject Heading:* **1. Infrared radiation.**—*C.E.P.B.*

3.3–139 551.521.63

Aliverti, Giuseppina and Pannocchia, G., **Risulatati di un anno di misura eseguite a Pavia, a cielo sereno, con il dosimetro per l'ultravioletto.** [Results of one year of measurements made at Pavia during clear skies with an ultraviolet dosimeter.] *Annali di Geofisica*,

Rome, 4(2):207–211, April 1951. 2 figs., table, 2 refs. **MH-BH**—During the year Oct. 1944–Sept. 1945, UV measurements were made on 41 days when the sky was clear. These are shown graphically with respect to solar angle (20°–60°), giving a minimum in July for high solar angles. Annual march agrees with ozone variations in upper atmosphere. Average intensity of radiation on all days for each 50° solar angle for each month is shown in a table. *Subject Headings:* **1. Ultraviolet light 2. Ozone variations.**—*M.R.*

3.3–140 551.521.7:551.510.535

Bates, David R., **The temperature of the upper atmosphere.** *Physical Society of London, Proceedings, B*, 64:805–821, 1951. 7 tables, 51 refs., 23 equations. **DWB**—Assuming that at 110 km temperature is about 300°K and particle concentration $7.4 \times 10^{12}$/cm$^3$, effects of various temperature gradients up to 200–500 km surmounted by an isothermal region are tabulated and the thermal equilibrium in the F region studied. The estimate, based on radio measurements, of the energy gained from ionizing photons is insufficient to balance loss by conduction and emission, and it is suggested that the estimated gain of energy is too low, heat being also supplied to upper atmosphere by unobservable ionization. This should vary with sunspot cycle, agreeing with a suspected sunspot cycle in variation of level and temperature of ionosphere layers. *Subject Headings:* **1. Upper air temperatures 2. Ionosphere.**—*C.E.P.B.*

3.3–141 551.521.7:523.75

Ellison, M. A., **Source points of radio noise bursts associated with solar flares.** *Nature*, London, 167(4258):941–942, June 9, 1951. 12 refs. **DLC**—Discussion of a number of recent observations of visible flares followed after a lag by radio noises, and their meaning in solar physics. Author discusses exact relation between visible radiation from flares and radio noise apparently from the same source point. *Subject Headings:* **1. Solar flares 2. Radio noise bursts.**—*C.E.P.B.*

## TEMPERATURE

(*See also items:* 3.3–52, 3.3–234)

3.3–142 551.524.33:551.583.13

*Karský, Vladimir, **Dlouhodobé průměry teplot vzduchu.** [Averages of atmospheric temperature over long periods.] *Meteorologické Zprávy*, 4(1–2):23, 1950. fig. **MH-BH**—The table on page 2 of the cover shows monthly and annual air temperature averages for the period of 1901–1930 obtained from 48 observation stations in Bohemia and Moravia. Only the Prague station shows an absolute continuity of location and observation for the entire period. The distribution of the stations is shown on the attached chart. This distribution is not even but is sufficiently dense. There is, however, an unfortunate paucity of stations in the 800–1300 meter altitude range. *Subject Headings:* **1. Temperature normals 2. Long period records 3. Normal period (1901–1930) 4. Czechoslovakia.**—*G.T.*

3.3–143 551.524.36:551.506.1(41/2)

Great Britain. Meteorological Office, **Values of highest and lowest minimum temperatures (0–24 h) at Kew Observatory, 1871–1950.** [London, 1951.] 4 p. tables. Mimeographed.—Tables give for each day the highest and lowest minima and the years in which they occurred. *Subject Headings:* **1. Minimum temperatures 2. Kew, England.**—*C.E.P.B.*

3.3–144 551.524.37(410)

Belasco, J. E., **Freezing days in Great Britain.** *Meteorological Magazine*, London, 80(950):213–224, Aug. 1951. 2 figs., 13 tables. **DWB**—A "freezing day" is one with 24 hour mean temperature below 32.5 or $\frac{1}{2}$(max.+min.) below 32.6°F. Frequency tables and corresponding mean temperatures are given for various stations. Duration of spells (up to 34 days) at Kew, and spells below specified temperatures are tabulated. Relations to air mass are discussed and mean temperature in Siberian air (Dec. 20, 1938) and Polar air (Dec. 15, 1950) illustrated. *Subject Headings:* **1. Temperature frequencies 2. Freezing temperatures 3. Cold fronts 4. Great Britain.**—*C.E.P.B.*

3.3–145 551.524.37

Range, Paul, **Die drei kalten Kriegswinter 1939/40, 1940/41, 1941/42.** [The three cold war winters.] *Erde*, Berlin, No. 1:26–35, **1951/52.** tables, 5 refs. **DLC**—Gives temperature, ice- and frost-day data for Dahlem, Berlin, compared with 50-year mean, and comparison of duration of frost period with each winter since 1766/7 (1939/40, 74 days, exceeded only by 1829/30, 80 days). Extremes of temperature and historical data on freezing of Baltic, Black Sea, Rhine, etc. given. Periodicity briefly discussed. *Subject Headings:* **1. Severe winters 2. Berlin, Germany.**—*C.E.P.B.*

3.3–146 551.524.4:551.578.7

Imrie, B. H., **Temporary formation of a surface inversion as a consequence of wintry showers.** *Meteorological Magazine*, London, 80(950):231–233, Aug. **1951.** 3 figs. **DWB**—On Feb. 6, 1951, on Cumberland coast cooling by 4°F due to hail caused an inversion from surface to over 350 ft. A smoke trail showed ceiling. Anemograph showed absence of turbulence. *Subject Headings:* **1. Temperature inversions 2. Hail 3. Cumberland, England.** —*C.E.P.B.*

3.3–147 551.524.7:551.510.5

Holzapfel, Rupert, **Zum Mechanismus des täglichen Temperaturganges in den Stockwerken der Troposphäre.** [On the mechanism of the diurnal variation of temperature in the layers of the troposphere.] *Annalen der Meteorologie*, 4(1–6):45–48, **1951.** fig. German and English summaries p. 45. **MH-BH**—Using radiosonde ascents on calm radiation days, the diurnal variation of temperature is plotted at 12 levels from 100–7000 m. Three main layers are distinguished, separated by small Cu. layers at about 1800 and 4800 m. In each layer the daily range is large at the bottom and decreases upwards. *Subject Headings:* **1. Upper air temperatures 2. Atmospheric structure.**—*C.E.P.B.*

3.3–148 551.524.7:551.571.7

Möller, Fritz and de Bary, E., **Der Wärme und Wasserdampfhaushalt der freien Atmosphäre.** [The heat and water vapor economy of the free air.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:142–155, **1951.** 2 figs., 5 tables, 14 refs., 8 equations. German, English and French summaries p. 142–143. **DWB**—Author first discusses mean monthly heat transport (cal/cm²/sec) over Lindenberg and S. E. England; this leads to some difficulties. He then calculates heat balance (°C/day) in 850–100 mb over (I) England-N.W. Germany, (II) N.E. Atlantic, in each month April 1949–March 1950 from radiosondes. Over (I) he finds average cooling by 0.5°/day at ground to 1.8° at 300 mb, warming in the stratosphere. Over (II) cooling is less but in both areas it is unexpectedly large. The annual variation of the humidity balance in the same areas up to 500 mb and its relation to the difference evaporation-precipitation are also discussed. *Subject Headings:* **1. Heat balance 2. Humidity balance 3. England 4. Germany 5. Northeast Atlantic.**—*C.E.P.B.*

## ATMOSPHERIC PRESSURE AND WIND

### PRESSURE

(*See also items:* 3.3–102, 3.3–105, 3.3–218)

3.3–149 551.541

Scorer, R. S., **Gravity waves in the atmosphere.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:176–193, **1951.** 2 figs., 15 refs., 30 equations. English, German and French summaries p. 176–177. **MH-BH**—A mathematical discussion of waves of period, short compared with the day in air streams with no horizontal velocity gradient, deriving a fundamental equation (15) for the relations between wave length, height, and velocity. The paper emphasizes the difficulties of calculation. Unstable waves are rare or impossible. Stable waves depend on the structure of the atmosphere and are at rest relative to the ground, the most important being in lee of mountains. *Subject Headings:* **1. Wave mechanics 2. Lee waves.**—*C.E.P.B*

3.3–150 551.543:551.590.21:550.384

Craig, Richard A., **Atmospheric pressure changes and solar activity.** *New York Academy of Sciences, Transactions, 2nd Ser.*, 13(7):280–282, May **1951.** **DLC**—A brief summary of a statistical study made by the author under contract with the Air Force Cambridge Research Center. The method used by the DUELL's in their study of the effect of solar activity on surface pressure is used to determine what correlation exists, if any, between the pressure 1, 2, 3, 4, 5, 6 . . . 40 days after 160 key days (with respect to geomagnetic character of the day, assuming the latter to be a function of solar activity). The average pressure variation following disturbed days is highly negatively correlated with that following geomagnetically quiet days. The statistical significance of results is discussed objectively. *Subject Headings:* **1. Solar influences 2. Atmospheric pressure.**—*M.R.*

3.3–151 551.547.1:533

Landt, E. and Lehnert, R., **Barometrische Höhenformel und Maxwellsches Geschwindigkeitsverteilungsgesetz.** [Barometric height formula and the Maxwell Law of Distribution of Velocities.] *Zeitschrift für physikalische Chemie*, 197(5–6):247–255, Aug. **1951.** 2 figs., equations, refs. **DLC**—On the basis of a one-dimensional model for a homogeneous (isothermal) gas in a gravitational field the barometric height formula $p(x)/p_0 = e^{-mgz/kT} = e^{-Mgz/RT}$ is deduced kinetically and Maxwell's Law $f(v) = (m/2\pi kT)e^{-mv^2/2kT}$ is directly deduced from it. *Subject Headings:* **1. Barometer reduction 2. Height computation 3. Aerodynamics.**—*C.E.P.B.*

3.3–152 551.547.3(82)

Schwerdtfeger, Werner, **Hohe und komplexe Druckänderungen im Bereich der Anden.** [High and complex pressure changes in the region of the Andes.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:194–202, **1951.** 2 figs., table, 8 refs. German, Spanish, English and French summaries p. 194–195. **DWB**—Author correlates pressure changes, in 2 winter months with a zonal circulation, at Juan Fernandez 800 km. west of Andes with Villa Mercedes 450 km east of Andes. The best correlation (0.79) is for a lag of 13 hours giving a velocity of 100 km/hr. This is near the mean wind velocity at a height of 10 km (300 mb). Nearer the Andes the passage of a zonal pressure wave is accompanied by secondary effects which are examined for June 18–25, 1950. *Subject Headings:* **1. Pressure waves 2. Orographic effects 3. Andes.**—*C.E.P.B.*

## WIND

(*See also items:* 3.3–47, 3.3–84, 3.3–106, 3.3–113, 3.3–153, 3.3–218, 3.3–242)

3.3–153 551.551:551.557

Bannon, J. K., **Turbulence at high altitude: a further meteorological analysis.** *Meteorological Magazine*, London, 80(953):331–332, Nov. **1951.** table, 7 refs. **MH-BH**—Summarizes an analysis (*Met. Research Paper*, No. 660, London 1951) of turbulence between 18,000 and 40,000 ft in 1950 compared with upper air data. In most cases turbulence was associated with wind shear. Turbulence without shear may be due to degradation of large eddies. *Subject Headings:* **1. Turbulence 2. Upper air winds.**—*C.E.P.B.*

3.3–154 551.551

California. University, **Diffusion in the free atmosphere.** Contract W28-099ac-439, Tenth Progress Report, Dec. 15, **1950.** 10 p. 2 figs., refs. **DWB**—Turbulent diffusion in the free air was studied by means of hundreds of 2″ soap bubbles released from a generator suspended 100 ft below a captive balloon at an elevation of 1000 ft above a smooth, dry lake bed on the Mojave Desert in California at a time when surface wind speeds were <5 miles/hour and the atmosphere was quite stable with the nocturnal inversion between the ground and the observation level. Wind and temperature profiles as well as photographs of the bubbles are used in calculations to test TAYLOR's theory. Curves based on this initial test agree well with TAYLOR's obtained from balloon cluster releases (1921). *Subject Headings:* **1. Turbulence 2. Eddy diffusion 3. Soap bubble releases 4. Mojave Desert, California. I. Edinger, James G. II. Contract W28-099ac-439.**—*M.R.*

3.3–155 551.551:533.16

Townsend, A. A., **On the fine-scale structure of turbulence.** *Royal Society of London, Proceedings*, 208:534–542, **1951.** 3 figs., 13 equations, 7 refs. **DWB**—Author discusses a comparison of experimental studies of isentropic turbulence with current theories of turbulent energy transfer and decay. He suggests that motion due to small scale turbulence "is essentially a random distribution of vortex sheets and lines, in which the vorticity distribution is effectively stationary in time, due to balance between the opposing effects of vorticity diffusion by molecular viscosity, and vorticity production, and convection by the turbulent shear." *Subject Headings:* **1. Turbulence theory 2. Viscosity.**—*From author's abstract.*

3.3–156 551.553.21(4)

†Voigts, Heinrich, **Der europäische Sommermonsun und seine Auswirkung in Mitteleuropa.** [The European summer monsoon and its effect in central Europe.] *Petermanns Geographische Mitteilungen*, 95(4):231–238, **1951.** 6 figs., tables, 30 refs. **DLC**—A survey of the literature, discussing pressure changes over the East Atlantic and Europe in May-Sept. as an interaction between the planetary circulation and the seasonal horizontal exchange between land and sea ("cellular monsoon"). The latter brings an irregular migration of high pressure from central Europe to its western coasts. There are two types: true monsoon (NW winds without fronts, little rain); and monsoon rains associated with fronts in western weather type and cellular inbreaks of maritime air. Main situations of frontal zones are defined at surface in relation to 500 mb circulation. An ideal monsoon sequence from May 25 to Aug. 22 is divided into 7 phases (after Flohn). *Subject Headings:* **1. Monsoon circulation 2. Europe.** —*C.E.P.B.*

3.3–157 551.554:551.551

Inoue, Ei-ichi, **On the structure of wind near the ground, I.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(7):219–223, July **1950.** fig., 5 refs., 23 equations. In Japanese, English summary p. 223. **MH-BH**—Assuming a turbulent wind to be made up of a mean flow and groups of eddies of different sizes and speeds, the mutual action between eddies is of the same form as Stokes' law of friction. Assuming that the rate of energy dissipation is the same for all ranks of eddies, the distribution of energy among eddies is calculated as $n^{-5/3}$, where $n$ is the number per second. This is approximately verified for $n = 0.1$ to 1. For Pt. II (*see item* No. 2.10–116 in October 1951 *Meteorological Abstracts*). *Subject Headings:* **1. Wind structure 2. Atmospheric turbulence.**—*C.E.P.B.*

3.3–158 551.554:551.551

Inoue, Ei-ichi, **On the structure of wind near the ground, III, IV, V.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 28(10):367–376, Oct. **1950**; 29(1,2):14–19, 59–66, Jan., Feb. **1951.** figs., table, refs., equations. In Japanese, English summaries p. 223, (19), (65). **MH-BH** In Pt. III it is reported that it is found from a mathematical discussion confirmed by observation of natural winds that the time of passage and scale of the largest effective eddy are proportional to the period of observation T, and the smallest eddy to $T^{1/3}$. In Pt. IV the vertical structure of the wind is regarded as made up of mean flow and eddies of many stages of diameter. The diameters of the largest eddies are proportional to the height, but their vertical velocity is independent of height. These large eddies derive their energy from the mean flow and pass it on to smaller eddies. The thickness of the laminar sublayer is defined by the limiting application of this theory. In Pt. V the largest (or coupling) eddy is considered to maintain the connection between the horizontal and vertical wind structure. The horizontal and vertical movements of this eddy are correlated, but the observed eddies contain other components. The largest eddy observed usually increases with time. *Subject Headings:* **1. Wind structure 2. Atmospheric turbulence.**—*C.E.P.B.*

3.3–159 551.555.3:551.588.2

Hambálek, Josef, **Vliv föhnu na kvalitu podnebí horní Čeladné.** [The influence of the föhn on the character of the climate of upper Celadná.] *Meteorologické Zprávy*, 4(1–2):9–14,

**1950.** 2 figs., tables. **MH-BH**—The upper part of the village of Celadná is situated 500 to 600 m above sea level on the northern spur of the Smrk mountain chain and is open to the W. and N.W. but less so to the N., N.E., and E. A comparison between weather elements in Celadná and Ostrava shows noticeable differences. All these can be attributed to the influence of föhn. In Celadná 47% of all winds in the fall bear the character of föhn. In winter this is 37% and in spring 36%. There is hardly any föhn in summer. A detailed map shows location of hills, valleys and towns, and extent of föhn winds. *Subject Headings:* **1. Föhn effects 2. Orographic effects 3. Beskids, Czechoslovakia.**—*G.T.*

3.3–160 551.555.3

Rossmann, Fritz, **Die Föhnausbildung aus der Föhnmauer.** [Föhn development by the föhn wall.] *Zeitschrift für Meteorologie*, 5(10):300–304, Oct. **1951.** fig., 4 refs., 8 equations. **MH-BH**—Author expands his 1950 theory of the moist-labile origin of the föhn by evaporation of cloud droplets (*see item* No. 9–103 in Sept. 1950 *Meteorological Abstracts*). He calculates acceleration and velocity of descending air for paths of different lengths inside and outside the cloud mass, and obtains a simple formula for the final velocity. He concludes that even thin föhn walls can give considerable velocities. *Subject Heading:* **1. Föhn development.**—*C.E.P.B.*

3.3–161 551.555.3(988)

Schatz, Heinrich, **Ein Föhnsturm in Nordostgrönland.** [A föhn storm in N.E. Greenland.] *Polarforschung*, 3(1):13–14, **1951. DWB**—During winter on Shannon Island (1943–44) föhns were often experienced. A very marked case on Feb. 20–24 is described. Temperature rose from −32 to +6°C, then oscillated. *Subject Headings:* **1. Föhn storms 2. Shannon Island, Greenland.**—*C.E.P.B.*

3.3–162 551.555.4

Eldridge, R. H., **Katabatic wind at Driffield,** *Meteorological Magazine*, London, 80(952): 288–293, Oct. **1951.** 3 figs., tables, 3 refs. **MH-BH**—Driffield is to east of Yorkshire Wolds. Paper gives data of time, duration and strength of wind, katabatic component, change of temperature and vertical lapse, and effect on visibility. *Subject Headings:* **1. Katabatic winds 2. Driffield, England.**—*C.E.P.B.*

3.3–163 551.555.8

**Meteorological note on the Sudan haboob.** *Meteorological Magazine*, London, 80(952): 298–299, Oct. **1951. MH-BH**—General account of the development and phenomena of the haboob. *Subject Heading:* **1. Haboobs.**

3.3–164 551.555.8

§Ward, A., **Duststorm at North Front, Gibraltar.** *Meteorological Magazine*, 80(949):196–198, July **1951.** fig. **DWB**—During depression of Dec. 5, 1950, visibility was reduced below 1000 m by dust and sand from Morocco. Followed by frontal mudrain. *Subject Headings:* **1. Dust storms 2. Gibraltar.**—*C.E.P.B.*

## AQUEOUS VAPOR AND HYDROMETERS

### CLOUD PHYSICS AND ICING

(*See also item:* 3.3–148)

3.3–165 551.57:37

Parker, Bertha Morris, **Clouds, rain, and snow.** Evanston, Ill., Row, Peterson, **1941.** 36 p. col. illus. **DLC**—An excellently written and illustrated popular scientific account of the physical processes involved in the formation of clouds, rain, snow, fog, dew, frost, rainbows, etc. The discussion is very simple and is directed at children of grammar school age. *Subject Headings:* **1. Hydrometeors 2. Teaching of meteorology.**—*I.L.D.*

3.3–166 551.57:551.586

Haude, Waldemar, **Zur Abschätzung des Wasserhaushaltes bei Agrarmeteorologischen Untersuchungen.** [On the determination of the water economy in agricultural meteorological investigations.] *Annalen der Meteorologie*, 4(1–6):139–150, **1951.** 9 figs., table, 6 refs. German and English summaries p. 139. **MH-BH**—Author first examines relations of air temperature at 2 m above uncultivated soil and meadow grass at Langenhagen, Hanover, with soil temperature at 0.3 and 10 cm. He then discusses relation between daily evaporation calculated from humidity gradient and wind with saturation deficit at 2 m with not very good results. The daily change in the water content of the soil is computed from precipitation and runoff over 6 km² and from computed evaporation. The results are compared with measurements of ground water level with good results. Finally, the soil water balance is compared with sugar-beet crop. Extensive discussion. *Subject Headings:* **1. Soil temperatures 2. Soil moisture 3. Hydrologic cycle.**—*C.E.P.B.*

3.3–167 551.571.36(54)

*Pramanik, S. K. and Hariharan, P. S., **Maximum dew-point temperatures in India.** *Indian Journal of Meteorology and Geophysics*, 2(2):138–141, April **1951.** fig., 2 tables. **MH-BH**—A table giving the highest dew point temperatures recorded at 0800 and 1700 Indian Standard Time over a period of 5 years for 24 representative stations in India and a table giving the maximum dew point among those of the five rainiest days over a period of 40 years are presented. For estimating the maximum possible precipitation the maximum dew point temperature that need be considered in India is 90°F. *Subject Headings:* **1. Dew point 2. Maximum possible precipitation 3. India.**—*I.L.D.*

3.3–168 551.571:628.8

Goethe, S. P., **Determination of minimum air requirements for summer air conditioning.** *Florida, University, College of Engineering, Technical Paper Series*, No. 47, 4(6):21–31, June **1950.** 5 figs., table, 3 refs., 3 equations. Reprint from: *Florida Engineering Journal*, April **1950. DWB**—A discussion with useful charts and nomograms of the psychrometric principles of total air determination, to serve as guide for air conditioning engineers to use in determining the optimum total amount of air that can be circulated for summer air conditioning. This can be done by means of lines drawn on a psychrometric chart and other calculations. However, the ideal condition of minimum total air (supply temperature at a minimum) cannot be realized because of cost and humidity factors. For example insulation of ducts may be necessary if supply temperatures are very low. *Subject Headings:* **1. Air conditioning 2. Humidity measurement.**—*M.R.*

3.3–169 551.571:628.8

Goethe, S. P., **What will be the relative humidity?** *Florida, University, College of Engineering, Technical Paper Series*, No. 26, 3(4), June **1949.** 6 p. 11 figs., table, 3 refs., 8 equations. Reprinted from: *Refrigerating Engineering*, Feb. **1949. DWB**—Charts and tables are given along with instructions for calculating relative humidity and other factors for air conditioning, when plants are not operating at capacity load. Examples are based on climatic data for Gainesville, Florida, using psychrometric charts adapted by the author. *Subject Headings:* **1. Air conditioning 2. Humidity measurement 3. Florida.**—*M.R.*

3.3–170 551.573:551.579.5:551.581

Thornthwaite, Charles Warren, **The water balance in tropical climates.** *American Meteorological Society, Bulletin*, 32(5):166–173, May **1951.** 4 figs., 10 refs. **MH-BH**—The studies of RAMDAS, BERNARD, and HARDY on the hydrologic balance in India, Belgian Congo, and Trinidad are reviewed briefly. THORNTHWAITE's method of potential evapotranspiration is applied to a study of the water balance of Puerto Rico and of the Belgian Congo. The moisture climates of these areas are illustrated on maps. Also the water balance of Santo Domingo is discussed. *Subject Headings.* **1. Hydrologic cycle 2. Evapotranspiration 3. Tropical meteorology 4. Puerto Rico 5. Belgian Congo.**—*I.L.D.*

3.3–171 551.574.1

*Hubert, W. E. and Wells, H. J., **Concentration of ice crystal nuclei under various weather conditions.** *General Electric Research Laboratory, Project Cirrus*, Final Report, Schenectady, July 30, 1951. p. 296–316. 4 figs., 7 tables, refs. **DWB**—Report on observations at Mt. Washington Observatory containing readings taken every three hours over a period of more than three years. Variations in nuclei concentrations are represented as functions of general weather types, "present weather," cloud type, snow, rain and drizzle classes, wind speed, pressure, temperature and air trajectory. *Subject Headings.* **1. Ice crystal concentration 2. Nuclei count 3. Weather 4. Mt. Washington, New Hampshire.**—*G.T.*

3.3–172 551.574.1

Kuhrt, Friedrich, **Über den Dampfdruck kleiner Tröpfchen.** [On the vapor pressure of small droplets.] *Naturwissenschaften*, 38(12):281, 1950. 2 refs., 4 equations. **DWB**—The Thomson-Gibbs equation for the increase of vapor pressure over small droplets, used in counting condensation nuclei, is discussed and corrections are applied for movement and rotation. These lead to the modified form:

$$\ln p_\nu/p_\infty = \frac{2\sigma O_\nu}{3kTR} - \frac{4}{\nu}$$

where $p$ is the vapor pressure of a droplet of $\nu$ molecules, of radius $R$ and surface $O_\nu$, $p_\infty$ is saturation vapor pressure over a flat surface and $\sigma$ surface tension. *Subject Headings:* **1. Condensation nuclei 2. Vapor pressure.**—*C.E.P.B.*

3.3–173 551.574.1:551.578.7 551.578.41 551.576.1

†Mason, B. J. and Ludlam, F. H., **The microphysics of clouds.** *Physical Society of London, Reports on Progress in Physics*, 14:147–195, 1951. 9 figs., 14 plates, 5 tables, 14 equations, 71 refs. **DLC**—An exhaustive summary of the voluminous recent literature. Spontaneous condensation of pure water vapor requires supersaturation of about 400%. Authors then discuss mode of action, nature, numbers and radii of condensation nuclei. Growth of droplets in cloud and fog is considered, from direct and indirect determinations of cloud droplet sizes and comparison with theories of Schumann, Howell, and Langmuir. Section 5 deals with experiments of initial stages of ice-formation—freezing and sublimation nuclei, supercooling, etc. The formation of ice crystals and snow flakes is considered in relation to cloud types and the formation and growth of hailstones, including problem of multiple layers, are discussed. Finally, the development of precipitation is analyzed, the efficiency of chain reactions emphasized, and a brief consideration given to artificial precipitation. *Subject Headings:* **1. Cloud physics 2. Raindrop coalescence 3. Snow crystal formation 4. Hail formation.**—*C.E.P.B.*

3.3–174 551.574.1

†Weickmann, Helmut K., **A theory of the formation of ice crystals.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:309–323, 1951. 8 figs., 37 refs. English, German and French summaries p. 309–310. **DWB**—Author summarizes theories and experiments on formation of ice crystals on nuclei and sets out a theory of "oriented overgrowth (epitaxy)." "Any suitable host crystal can orient an absorbed layer of $H_2O$ molecules. By piling up other layers of $H_2O$ molecules a very small ice crystal (ice seed) is created which can grow in supercooled water. Calculations of the effective temperature of mica, AgI and quartz are in fairly good agreement with experiment. This theory permits an explanation of the observed thresholds of ice formation which occur at about $-20°$, $-30°$, $-40°$, and $-60°$C. Occasionally capillary condensation of water molecules on a freezing nucleus will occur when the vapor is saturated with respect to ice but not with respect to water. . . ." *Subject Heading:* **1. Ice crystal formation.**—*From author's abstract.*

3.3–175 551.574.42

**Radio-telephone station at Great Dun Fell, Cumberland.** *Meteorological Magazine*, London, 80(952):300, Oct. 1951. 2 photos. **MH-BH**—Photos of rime on 120 ft tower at 2780 ft height, Jan. 16, 1951. *Subject Heading:* **1. Rime.**

3.3–176 551.574.42 551.574.7

**Symposium on the deposition of ice on exposed surfaces.** *Journal of Glaciology*, London, 1(10):536–550, Oct. **1951.** 5 figs., 5 refs., equations. Includes: Hardy, J. K., "The physics of the deposition process"; Coombs, D. H., "Icing on electric railways"; Lilley, G. G., "Icing in cold stores"; Sutherby, F. S., "Icing problems on ships"; "Discussion."—HARDY discusses the thermodynamics of a cooler in which ice is forming on the pipes, and the mechanics of icing of aircraft and its prevention. COOMBS discusses nature and application of de-icing compounds for conductor rails and special forecasts of icing risks. LILLEY discusses problems of ice formation on inside surfaces of cold rooms and airlock walls, on sealing surfaces of cold store doors and on metals etc. of high thermal conductivity penetrating the insulation. Preventive measures are described. SUTHERBY describes serious effects of icing on ships in the Arctic, especially by spray, and its prevention. In the discussion VINCENT SCHAEFER described research in the United States on ice nuclei and supercooling, and referred to possible effects in controlling weather. *Subject Headings:* **1. Icing 2. Icing prevention 3. Weather control 4. Aeronautical meteorology. I. Hardy, J. K. II. Coombs, D. H. III. Lilley, G. G. IV. Sutherby, F. S. V. Schaefer, Vincent.**—*C.E.P.B.*

3.3–177 551.574.7:551.509.317

§Červený, Jaroslav, **Námraza na letodlech.** [Icing on airplanes.] *Meteorologické Zprávy*, 4(1–2):19–21, **1950.** 4 figs. **MH-BH**—There are four typical causes leading to icing and correspondingly four types of airplane icing, which range from rime to thick, transparent crust of ice. For working out a short-term forecast two elements are necessary: 1) results of radiosonde ascents from stations through which a vertical section will be made; and 2) a vertical section in the desired direction based on the largest possible number of aerological ascents. The icing danger area will be determined from the observed temperature and relative humidity. *Subject Headings:* **1. Icing of aircraft 2. Icing forecasting.**—*G.T.*

## CLOUDS

(*See also items:* 3.3–115, 3.3–173)

3.3–178 551.576

Kidd, G. C. H., **Determining the location of distant cumulonimbus cloud in Rhodesia.** *Weather*, 6(8):251, Aug. **1951. DWB**—Location and height are determined by observations of bearing and angle of elevation from two stations. *Subject Headings:* **1. Cumulonimbus clouds 2. Cloud heights 3. Rhodesia.**—*C.E.P.B.*

3.3–179 551.576.1

Gillman, M. C., **Cumulus cloud development in east Africa.** *Meteorological Magazine*, London, 80(953):337, Nov. **1951.** 5 photos. **MH-BH**—Photos show development and dissipation of Cu and CuNb cloud. *Subject Headings:* **1. Cloud photographs 2. Cloud formation 3. Cloud dissolution 4. East Africa.**

3.3–180 551.576.1:77

Grant, D. R.; Frith, Ronald and Shellard, H. C., **High-level cloud photographs.** *Meteorological Magazine*, London, 80(950):229, Aug. **1951. DWB**—Comments on note and photos by G. W. HURST in *Meteorological Magazine*, March 1951 (*see item* No. 2.10–133 in Oct. 1951 *Meteorological Abstracts*). *Subject Heading:* **1. Cloud photographs.**

3.3–181 551.576.11

Hill, E. C. Clear, **Breaking waves in cirrus cloud.** *Weather*, 6(9):286–287, Sept. **1951.** fig. **DWB**—An account of visible wave formation in edge of CiSt at 35,000 ft over S.E. England, seen from an aircraft. *Subject Headings:* **1. Cloud formation 2. Cirrus clouds 3. England.**

3.3–182 551.576.12(04)

Bonacina, L. C. W., **London's picturesque cloud scenery.** *Weather*, 6(11):330–333, Nov. **1951. MH-BH**—Popular account. *Subject Heading:* **1. Clouds.**

## PRECIPITATION

(*See also items:* 3.3–68, 3.3–70, 3.3–79)

3.3–183 551.577(42)

Great Britain. Meteorological Office, **Kew Observatory.** [**Long period rainfall averages for the period 1871–1950.**] [n.d.] 7 p. tables. Mimeographed.—Daily averages of rainfall amount, frequencies of no rain and of amounts of 0.1 inch or more, highest in each day and list of spells of 14 or more consecutive dry days and 5 or more rainy days. *Subject Headings:* **1. Precipitation 2. Long period records 3. Kew, England.**—*C.E.P.B.*

3.3–184 551.577.2:551.577.3(494)

*Bider, M. and Thams, J. Chr., **Das Niederschlagsregime nord- und südwärts der Alpen auf Grund zehnjähriger Pluviographenregistrierungen.** [The rainfall regime north and south of the Alps on the basis of 10-year pluviograph records.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 2(3):123–148, **1951.** 8 figs., 11 tables, 14 refs. German, English and French summaries p. 123–124. **MH-BH**—A comparison of the amount and nature of the rainfall at Basel (47°33′N, 7°35′E) and Locarno-Monti (46°10′N, 8°48′E) based on pluviograph data 1936–45. Tables and graphs compare amount, duration, days and intensity, and give particulars of heavy rain (mm exceeding $\sqrt{(5t-t^2/576)}$, $t$ in minutes). Diurnal variation of all these is discussed. Seasonal frequency distributions and probabilities tabulated and discussed include daily amounts, durations and intensities, and numbers of falls in a day. *Subject Headings:* **1. Precipitation frequencies 2. Precipitation variations 3. Switzerland.**—*C.E.P.B.*

3.3–185 551.577.2:636(41/2)

Evans, W., **An ecological survey of hill sheep farming in Breconshire.** *Agriculture,* London, 58(1):5–13, April **1951.** fig., 3 tables, 8 refs. **DA**—The distribution and vertical range (up to 2800 ft) of 9 breeds of sheep are analyzed and compared with rainfall and number of raindays. *Subject Headings:* **1. Rainfall distribution 2. Animal ecology 3. Breconshire, Wales.**—*C.E.P.B.*

3.3–186 551.577.3:551.579.1(54)

Pramanik, S. K. and Rao, K. Nagabhushana, **Rainfall in the Mahanadi catchment above Hirakud.** *India, Central Board of Irrigation, Journal,* 7(6):604–630, Nov. **1950.** diagrs., tables, graphs. **DWB**—Reference is made to a report on floods in the delta of Orissa by Prof. Mahalanobis, published by the Orissa Government in 1941, and the importance of presenting additional data of rainfall in the Mahanadi catchment above the dam site at Hirakud for the years 1915 to 1944 is stressed. Rainfall, especially storm rainfall, data are shown on two charts, a curve and 21 tables covering all aspects of the problem. *Subject Headings:* **1. Rainfall data 2. Storm rainfall 3. Hydrometeorology 4. India.**—*G.T.*

3.3–187 551.577.2(75)

**Precipitation in Tennessee River Basin.** *Tennessee Valley Authority, Hydraulic Data Branch, Report* No. 0-243-194, May **1951.** 24 p. charts, graphs, tables. **DWB**—Data of the daily precipitation at the rainfall station in the Tennessee River Basin, departures from 60 year mean precipitation and evaporation data at land pan stations are given. The drought and wind conditions during this month are discussed. Precipitation and drought data are also presented cartographically. *Subject Headings:* **1. Rainfall distribution 2. Tennessee.**—*I.L.D.*

3.3–188 551.577.34

Taverner, L. E., **Rainfall reliability in Dorset.** *Weather,* 6(9):276, Sept. **1951.** 2 figs. **DWB**—Diagrams of accumulated and monthly rainfall in Dorset show no recent secular decrease. *Subject Headings:* **1. Rainfall variations. 2. Dorset, England.**—*C.E.P.B.*

3.3–189 551.577.35:551.586:63

Gellert, J. F., **Ein Jahrzehnt Niederschlagschwankungen und ihre Auswirkungen auf das Weideveld und die Wirtschaft.** [A decade of precipitation fluctuations and their effect on

grazing and farming.] *Erkunde*, Bonn, 4(1–2):110–112, **1950.** fig., ref. **DLC**—Reference is made to a curve representing rainfall amounts in southwestern Africa, prepared from the growth of trees by H. WALTER and W. RUSS. The curve was extrapolated up to 1960 showing, thus far, a good agreement with actual rainfall measurements. The weather situation in southwestern Africa in the last decades is found to fit into the general weather pattern. Economic effects of drought are discussed. *Subject Headings:* **1. Precipitation variations 2. Agricultural climatology 3. Southwest Africa.**—*G.T.*

3.3–190 551.577.36

Liu, En-lan, **Rainfall variability or reliability.** *Chinese Geophysical Society, Journal*, 2(2):191–215, Dec. **1950.** 11 tables, 3 graphs, 10 refs., equations. In English, Chinese summary p. 191–192. **MH-BH**—Rainfall variability is expressed as: 1) mean % departure of annual rainfall from average (range 15% in south to 30% in north), compared with India and defects of method noted; 2) by wettest minus driest years as % of average—an unstable index; 3) interquartile difference as % of mean, and 4) standard deviation. The last two agree in general. Seasonal variabilities analyzed for different districts. No direct relation between variability and amount of rain. Results agree well with distribution of calamities caused by floods and droughts. *Subject Heading:* **1. Rainfall variations.**—*C.E.P.B.*

3.3–191 551.577.37:551.508.321

Chester, J.; Landon, F A.; Ibberson, L. A. and Knighting, E., **Effect of heavy rain on pilot balloons.** *Meteorological Magazine*, London, 80(950):225–227, Aug. **1951.** fig., table. **DWB**—A double theodolite pilot balloon ascent in very heavy rain at Shoeburyness showed that as rain collected on balloon, rate of ascent declined and gave place to descent. An experiment showed that a wetted balloon released from a tower fell until dry, then rose. *Subject Headings:* **1. Pilot balloons 2. Rainfall effects.**—*C.E.P.B.*

3.3–192 551.577.37(54)

Jackson, G. C., **Storm over Colombo, 17 April 1949.** *Weather*, 6(9):282–283, Sept. **1951. DWB**—Account of a very heavy rainstorm in which 11.73 inches fell, 7.2 inches in 82 minutes, 1.2 in 9 minutes. *Subject Headings:* **1. Rainfall extremes 2. Colombo, Ceylon.**

3.3–193 551.577.37

Levert, C., **Een zeldzaam zware slagregen.** [An unusually heavy shower.] *Hemel en Dampkring*, 49(9):159, **1951. DLC**—At Boskoop, Aug. 1, 1950, 46 mm fell in 33 min and 96 mm in 90 min. These falls are new records for Holland. *Subject Headings:* **1. Rainfall extremes 2. Netherlands.**

3.3–194 551.577.38

Vorel, Čeněk, **Sucha na ůzemi Československé Republiky v poslednich desitiletich.** [Droughts in the Czechoslovak Republic in the last decades.] *Czechoslovakia, Státní ústavy hydrologický a hydrotechnicýk T. G. Masaryka v Praze, Práce a Studie*, No. 22, **1937.** 14 p. figs., 5 tables. French summary p. 13. Reprint from: *Veřejni služba technicka, Zprávy*, **1937.** —A "drought" in a river basin is defined as a group of months in each of which the mean runoff is less than the long period mean. Droughts are listed for 5 basins and their statistical characteristics tabulated. *Subject Headings:* **1. Drought 2. Czechoslovakia.**—*C.E.P.B.*

3.3–195 551.577.51:551.508.77:551.585.7

Petrovič, Št., **Výskum srážkových pomerov totalizátormi na hrebeňoch slovenských hôr.** [Research on precipitation with totalizers on the ridges of Slovak mountains.] *Meteorologické Zprávy*, 4(1–2):16-19, **1950.** 5 figs., table. **MH-BH**—This is only to give some information on initial results and difficulties of research on precipitation on mountain ridges, which will have to be revised when sufficient data become available. The first investigations on mountain ridges were made in 1937 in connection with a tourist home in the Tatra mountains. This was carried on for 4 years and showed astonishing results. Twelve totalizers were set up from 1942 to 1944 in connection with the proposed use of water energy. During the fight for the liberation of Slovakia all but a few reports and most of the totalizers were destroyed. Information

is available for the years 1947–1949, but this period is too brief to permit conclusions. There are 22 totalizers in operation in Slovakia now, most of them the Swiss type. Part of the data hitherto obtained is given in a table. Four of the gages and their installation are shown in vivid photographs. *Subject Headings:* **1. Rain gages 2. Mountain meteorology 3. Slovakia.**—*G.T.*

3.3–196 551.578(661)

Suter, Karl, **Schnee und Regen in der algerischen Nordsahara.** [Snow and rain in the Algerian North Sahara.] *Erde*, Berlin, No. 1:14–17, 1951. 52. 2 photos. **DLC**—An account of rain followed by snow at Colomb-Béchar Jan. 10, 1951 and their results, with some general notes on the effect of rain in the Sahara. *Subject Headings:* **1. Precipitation variations 2. Snow 3. Sahara Desert.**

3.3–197 551.578.11

Blanchard, Duncan C., **The distribution of raindrops in natural rain.** *General Electric Research Laboratory, Project Cirrus*, Final Report, Schenectady, July 30, 1951. p. 81–93. 6 figs., 2 tables, 6 refs., equation. **DWB**—A report on experiments made at Schenectady, N. Y. in 1949 for determining size and distribution of raindrops in natural rainfall is given in this article, including some of their results and conclusions. The experiments were based on the Bentley flour technique. The size of raindrops was calculated from the volume of flour pellets. *Subject Headings:* **1. Raindrop size distribution 2. Bentley flour pellet technique.**—*G.T.*

3.3–198 551.578.11:551.508.765

Blanchard, Duncan C., **The use of sooted screens for determining raindrop size and distribution.** *General Electric Research Laboratory, Project Cirrus*, Final Report, Schenectady, July 30, 1951. p. 94–101. 3 figs., 2 refs. **DWB**—According to this report the use of a mesh screen sooted with a thin layer of carbon will eliminate a disadvantage of the Bentley flour technique (the effect of wind) in determining size and distribution of raindrops. The drops were found to pass through the screen with a negligible amount of spattering and the actual sizes of the drops were determined by applying a curve representing the relation between the mark left and the raindrop. The screen was also used in flight. *Subject Headings:* **1. Raindrop size distribution measurement. 2. Sooted screen technique.**—*G.T.*

3.3–199 551.578.11

Neumann, J., **Drop size and relative mass contributed in rain.** *Journal of Meteorology*, 8(3):205–206, June 1951. fig., 3 refs., 6 equations. **DWB**—The author demonstrates that the maxima of the family of curves for different rain intensities fall on a rectangular hyperbola. *Subject Headings:* **1. Raindrop size distribution 2. Rain intensities.**—*I.L.D.*

## HYDROMETEOROLOGY

*(See also items: 3.3–51, 3.3–170, 3.3–186, 3.3–231)*

3.3–200 551.579

Banerji, Sundhansu K., **Determination of snow-melt in the Himalayas.** *Weather*, 6(1):334–338, Nov. 1951. fig., 3 tables. **MH-BH**—Gives for the Kosi River catchment, including Mt. Everest and Kanchenjunga, for each month the precipitation (4 districts), and estimated river discharges. In Dec.–June the latter derives from snow-melt, mainly in the Upper Arun, but most of the snowfall is lost by evaporation. *Subject Headings:* **1. Snow melt 2. Water supply 3. Himalayas.**—*C.E.P.B.*

3.3–201 551.579

†Schulze, Alfred, **Die Zusammenhänge zwischen Niederschlag, Verdunstung und Abfluss.** [The connections between precipitation, evaporation and runoff.] *Zeitschrift für Meteorologie*, 5(11):323–330, Nov. 1951. 8 figs., 19 refs. **MH-BH**—A study of the relations in a number of central European rivers, classified as continental, maritime, central mountains, and Alps.

Regional annual and year to year variations of evaporation and runoff are briefly discussed, with reference to literature, and relations of runoff to precipitation examined for three rivers. The water balance of 10 river-groups is then examined for year, winter and summer half years and the ratio precipitation/runoff shown in diagram; it varies from nearly 4 (Weichsel, Oder, Elbe) to 2 (Rhine, Danube). *Subject Headings:* **1. Hydrologic cycle 2. Central European rivers.**—*C.E.P.B.*

3.3–202 551.579.1:551.583.14

*Oltman, Roy Edwin and Tracy, Hubert J., **Trends in climate and in precipitation-runoff relation in Missouri River Basin.** *U. S. Geological Survey, Circular* No. 98, April **1951.** 113 p. graphs, tables, refs. **DWB**—In the Missouri River Basin long term trends of annual precipitation over the period 1881–1940 manifest a decline in Montana, North Dakota, South Dakota, Nebraska and Kansas; the trends seem to be indeterminate in the rest of the basin. The downward trend is considered to end in the 1930's. Mean annual temperatures show an upward trend for the entire basin. Annual precipitation and mean annual temperature show a negative correlation over the period 1930–1940; there are observable decreasing runoff yields under constant precipitation. *Subject Headings:* **1. Hydrology 2. Runoff 3. Precipitation 4. Climatic trends 5. Missouri River Basin.**—*I.L.D.*

3.3–203 551.579.1

MacDonald, Roderick Hugh, **Relation between daily rainfall and flow of the River Shin.** Institution of Civil Engineers, Public Health Engineering Division, **1951.** 40 p. 15 figs., 7 tables, 18 equations, 8 refs. Advance copy, to be published in the Institution of Civil Engineers, Proceedings, Pt. III.—The River Shin has an area of 105 sq mi, in Sutherland, Scotland. Average daily rainfall calculated from 2 stations is converted to daily runoff by using depletion curves during periods of no rain and an allowance for evaporation. These figures agreed with measurements of runoff, 1947–1949, and the equations are used to give daily flow 1927–1946 for average and extreme years. The method can be applied to any basin for which the constants are known. *Subject Headings:* **1. Runoff 2. Scotland.** *C.E.P.B.*

3.3–204 551.579.2

Sharp, Robert P., **Melting versus evaporation in the Sierra Nevada, California.** *Journal of Glaciology*, London, 1(10):583, Oct. **1951.** —Decrease of volume July 19–Aug. 2, 1950 of a snow bank at 12,200 ft in Sierra Nevada, was measured and compared with runoff. Ninety-seven to ninety-nine percent of the wastage was due to runoff. *Subject Headings:* **1. Ablation 2. Sierra Nevada, California.**—*C.E.P.B.*

3.3–205 551.579.4

**Phenomenally rapid rise in level of the River Euphrates.** *Meteorological Magazine*, London, 80(952):299–300, Oct. **1951. MH-BH**—On March 10–12, 1950 the river at Habbaniya rose 8½ feet in 48 hours following heavy rain and rapid melting of snow. *Subject Headings:* **1. River stages 2. Euphrates, Asia Minor.**—*C.E.P.B.*

3.3–206 551.579.4

Potter, W. H., **Surface runoff from agricultural watersheds.** *National Research Council, Washington, D. C., Highway Research Board, Research Report*, No. 11-B:21–35, **1950.** 5 figs., 2 tables, 24 refs. **DWB**—The hydrologic characteristics of small watersheds, those smaller than 20 sq miles, differ from those of large watersheds. With reference to such small water sheds the author discusses the various procedures for supplementing short period runoff records with long time rainfall records, namely: 1) the direct relationship between rainfall intensity and amount of rainfall corresponds with rates and amounts of runoff, 2) rational method, 3) unit hydrograph and 4) infiltration theory. Also the use of probability studies for "integrating the frequency of occurrence of various rainfall intensities and patterns" and the theory of extreme values developed by GUMBEL for the analysis of runoff data are considered. *Subject Headings:* **1. Runoff 2. Watersheds.**—*I.L.D.*

3.3–207 551.508.79:551.579.5

Belcher, Donald Jenks; Cuykendall, T. R. and Sack, H. S., **The measurement of soil moisture and density by neutron and gamma-ray scattering.** *U. S. Civil Aeronautics Administration, Technical Development and Evaluation Center, Technical Development Report* No. 127, Oct. **1950.** 20 p. photos, diagrs., tables. **DWB**—A device for measuring soil moisture and density by lowering a radioactive radium-beryllium source and detector into a metal tube driven into the ground which operates on the principle that fast neutrons are converted into slow neutrons by impact with the moisture. The number of slow neutrons is proportional to the water content of the soil. Theory, construction of instrument, results of tests in laboratory and field, and advantages in distant recording, adaptability and accuracy are outlined and equipment and results illustrated. Device is also cheap and safe if proper precautions are taken. *Subject Headings:* **1. Soil moisture measurement 2. Radioactive measuring devices.**—*M.R.*

# CLIMATOLOGY AND BIOCLIMATOLOGY

## CLIMATOLOGY

(*See also items:* 3.3–107, 3.3–115, 3.3–170)

3.3–208 551.58(47)

Khromov, S. P., **O sovremennom sostoianii klimatologii.** [Modern climatology.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia,* 83(2):117–128, March–April **1951. DLC**—A polemical article in which the author defends climatology as a science against the contention of Kashin and Pogosian that climatology is too descriptive and not sufficiently grounded in physical explanations of climatic phenomena. The author discusses the various trends in climatology in Russia as represented by Voeĭkov, Berg, Rubinshteĭn, Fedorov, Alisov, Sapozhnikova, etc. and shows that physical climatology already is an essential part of climatology. Russian work in climatology is regarded superior to work done elsewhere and no mention is made of the trends and progress in climatology outside of the Soviet Union. *Subject Headings:* **1. Climatology 2. Climatological fads 3. U.S.S.R.**—*I.L.D.*

3.3–209 551.582:551.45(661)

Schiffers, Heinrich, **Begriff, Grenze und Gliederung der Sahara.** [Concept, limits and divisions of the Sahara.] *Petermanns Geographische Mitteilungen,* 95(4):239–246, **1951.** 3 figs., 24 refs. **DLC**—Includes an account of the climate of the Sahara and its zones according to seasonal rainfall tendency and wind regime. The climatic effects on land forms, limits from climatic, geographical, botanical, hydrographical and cultural standpoints, and local peculiarities are discussed. *Subject Headings:* **1. Climatology 2. Sahara Desert.**—*C.E.P.B.*

3.3–210 551.582.2(73/9):551.506.3

*American Automobile Association, **AAA climatic guide.** Washington, D. C., **1950.** 131 p. tables. **DLC, DWB**—Condensed tables of climatic data for about 250 cities in the 48 states, Hawaii and the District of Columbia, are presented for the benefit of the motorist. Data include monthly and annual mean and extreme temperatures, degree days, average and extreme precipitation, snow, sleet, hail, relative humidity, wind (average and extreme), sunshine, cloudiness and number of days clear, cloudy, rainy, and with snow, sleet, hail, thunderstorms, fog, and extreme temperatures. Charts show isolines of sunshine in summer and winter, and average number of days with snow cover. *Subject Headings:* **1. Climatic data 2. Applied climatology 3. United States.**—*M.R.*

3.3–211 551.582.2(798)(266)

Johnson, William M., Burch, Joseph E., Anderson, George R. and others, **The correlation of some climatological data of the Bering Sea and the Aleutian Islands.** Thesis (M.S.)—California Institute of Technology, **1944.** 19 p. **DWB**—Charts of mean pressure taken from the Daily Northern Hemisphere Sea Level Charts are presented for the North Pacific and Bering Sea region for Jan., April, July, Oct., and Dec. along with similar charts of mean temperatures, temperature difference between air and sea surface and fog frequency (June–

Aug.). *Subject Headings:* **1. Pressure normals 2. Synoptic charts 3. Aleutians 4. North Pacific. I. Bowen, Mark E. II. Carrigen, Ralph S. III. Denney, Roy D. IV. Jenista, Charles O. V. Miller, Keith W. VI. Robinson, Burton W. VII. Skinner, Wilfred A. VIII. Sorenson, John L.**—*M.R.*

## CLIMATIC CHANGES

(*See also items:* 3.3–136, 3.3–142, 3.3–202, 3.3–254)

3.3–212 551.583:551.513.1

Brooks, Charles E. P., **Geological climates in the light of modern meteorology.** *Weather*, 6(8):237–241, Aug. **1951.** 13 refs. **DWB**—Brief discussion of the development of the Quaternary Ice Age in terms of recent research on the heat balance and circulation of the atmosphere and the circulation of the oceans. *Subject Headings:* **1. Geological climates 2. Atmospheric circulation.**—*C.E.P.B.*

3.3–213 551.583.14

Endo, Jiro, **On the secular change of the climate in Japan (1st report).** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(3):90–96, March, **1951.** 5 figs., 10 tables. In Japanese, English summary p. 96. **MH-BH**—From 1903–24 to 1925–46 at Sakai on Japan Sea coast sunshine, depth of deepest snowfall, and amount of evaporation increased; humidity, days without sunshine, and stormy days increased. In Japan as a whole there has been a smoothing out of local differences of sunshine and humidity. *Subject Headings:* **1. Climatic trends 2. Japan.**—*C.E.P.B.*

3.3–214 551.583.14

Winter, H., **Änderungen im Sommerklima seit 150 Jahren.** [Changes in the summer climate in 150 years.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(3):82–90, **1951.** 4 figs., 3 tables, 4 refs. German, English and French summaries p. 82. **MH-BH**—Climatic variations at Vienna are shown by tables or graphs of 25 year means of mean and extreme summer temperatures (1776–1950), amount and days of summer precipitation (1851–1950), and vapor pressure. There is a clear opposition between temperature and precipitation; a period of cool, wet summers in early 20th century is attributed to an intensification of northern component of Central European circulation. *Subject Headings:* **1. Climatic variations 2. Vienna, Austria 3. Central Europe.**—*C.E.P.B.*

3.3–215 551.583.15

Ten Hoopen, K. J. and Schmidt, F. H., **Recent climatic variations in Indonesia.** *Nature*, London, 168(4271):428–429, Sept. 8, **1951.** 2 figs. **DWB**—Overlapping 11-year means of precipitation in East Indies 1879–1940 show two groups: one along equator, maximum 1920–1930; second in West Java (2–10°S), minimum 1920–1930. Correlation −0.75 is attributed to southward displacement of I.T.C. zone. Pressure at Hong Kong is positively correlated with West Java precipitation. *Subject Headings:* **1. Climatic variations 2. Indonesia.**—*C.E.P.B.*

3.3–216 551.583.3

Kölzer, Joseph, **Der derzeitige Stand der Eiszeitforschung.** [The present position of ice age investigation.] *Polarforschung*, 3(1):44–49, **1951.** 45 refs. **DWB**—Gives a summary of recent literature in German about European Ice Age. Then discusses theories of climatic change—continental drift, $CO_2$, changes of earth's orbit, crustal movements, radioactivity, and auxiliary meteorological factors. *Subject Headings:* **1. Climatic changes 2. Continental drift.**—*C.E.P.B.*

3.3–217 551.583.3:551.311.13

Leopold, Luna B., **Pleistocene climate in New Mexico.** *American Journal of Science*, 249:152–168, Feb. **1951.** 4 figs., 14 refs. **DWB**—An analysis of the meridional profiles of the mean temperature of the free atmosphere leads to the conclusion that the modern snowline of the Rocky Mountains is nearly identical with the mean level of the 0°C isotherm for the summer

months and to the corroboration of the postulate that snowlines are determined by summer temperatures. On the basis of this assumption, the author calculates the annual march of temperature during glacial times in New Mexico and estimates the relations between changes in temperature and depressions of snowline during Pleistocene time. The calculated mean annual temperature is applied to a study of the hydrologic balance of Lake Estancea. ANTEVS' conclusion that Lake Estancea existed in a period more humid than the present is corroborated. *Subject Headings:* **1. Climatic changes 2. Glacial periods 3. Quaternary climates 4. New Mexico.**—*I.L.D.*

3.3–218 551.583.3:551.543:551.556

Poser, Hans, **Zur Rekonstuktion der spätglazialen Luftdruckverhältnisse in Mittel- und Westeuropa auf Grund der vorzeitlichen Binnendünen.** [Reconstruction of late-glacial air pressure conditions in middle and western Europe from prehistoric continental dunes.] *Erdkunde*, Leipzig, 4(1–2):81–88, **1950.** fig., table, 17 refs. **DLC**—Earlier paleoclimatological investigations of west- and mid-European dunes are mentioned and the author's contribution to this field reported. Beaufort speed 5 is suggested as a probable average velocity of dune-forming winds, deduced from size of particles deposited, and J. BUBEL's assertion that dune-forming winds must have been of exceptional speed is rejected. A barometric pressure distribution chart is drawn up for the period in question on the basis of assumed wind speed and direction and with the aid of conclusions drawn from present pressure data. *Subject Headings:* **1. Paleoclimatology 2. Pressure distribution 3. Wind effects 4. Sand dune formation 5. Western Europe 6. Central Europe.**—*G.T.*

3.3–219 551.583.3

Schamp, Heinz, **Das Hochgebirge des südlichen Sinai und die Frage nach seiner diluvialen Vereisung.** [The high mountains of southern Sinai and the question of the diluvial glaciation.] *Erde*, Berlin, No. 1:18–25, **1951/52.** 2 photos, 14 refs. **DLC**—In consequence of Tertiary elevation and southward shift of storm tracks during Ice Age, Sinai mountains received heavy rainfall: local glaciation is probable, but not certain. *Subject Headings:* **1. Glacial periods 2. Sinai, Egypt.**—*C.E.P.B.*

3.3–220 551.583.3 529

Zeuner, Frederick E., **Dating the past. An introduction to geochronology.** 2nd ed. London, Methuen, **1950.** 474+p. 101 figs., tables, biblio. p. 405–450.—A discussion of the various methods of geological dating, some of which involve paleoclimatic considerations. Pt. I deals with dendrochronology back to 1000 B.C., involves relations of tree-growth to weather, solar radiation, and the sunspot cycle. Pt. II includes analysis of glacial varves, lake deposits and peats, and archeological dating. In Pt. III the astronomical theory of glaciation is applied to dating the climatic phases of the Pleistocene. Pt. IV deals with geological time on the grand scale—accumulation of sediment, pre-Quaternary varves, time-rate of geological processes, radio-activity methods, and time rate of biological evolution. Deep sea cores are discussed in an appendix. BULLARD, E. C., "Time and climate," *Nature*, London, 168(4263):48, July, **1951.** **DLC**—A critical review of FREDERICK E. ZEUNER's book. *Subject Headings:* **1. Climatic changes 2. Dendrochronology 3. Paleoclimates 4. Reviews. I. Bullard, E. C.**—*C.E.P.B.*

## CLIMATIC CLASSIFICATION

(*See also item:* 3.3–195)

3.3–221 551.585:58

Gibson, C. R., **Transition between the equatorial forest and the tropical grassland of Nigeria.** *Western Australia, Geographical Laboratory, Research Report*, No. 20, October **1950.** 10 p. diagr., table, refs. Mimeographed. **MH-BH**—The region dealt with covers the transition from the hot humid region in the south to the hot sub-humid in the north, exaggerated by orography. Section 3 analyzes the climate by THORNTHWAITE's 1931 system, influence of winds, and rainy seasons. A map shows distribution of zones. *Subject Headings:* **1. Climatic zones 2. Orographic influences 3. Thornthwaite's classification 4. Nigeria, Africa.**—*C.E.P.B.*

3.3–222 551.585(72,73)

Gorczyński, Władyslaw, **El mejor clima en America del Norte, con alusión especial sobre el de Mejico.** [The best climate of North America, with special reference to Mexico.] *Revista Meteorológica*, Montevideo, 10(36,37):84–88, Jan.–April **1951.** fig., table. **MH-BH**—Outlines a system of climatic classification consisting of five major groups: tropical, arid, moderate, extreme, and snowfall. These groups are further subdivided into ten types according to average temperature, humidity, percentage of drought, cloudiness, precipitation, etc. A chart shows the location of each of the ten types of climate in North America. Concludes with reasons why Mexico has one of the most agreeable climates in the world. *Subject Headings:* **1. Climatic classification 2. Mexico 3. North America.**—*M.L.R.*

3.3–223 551.585

†Hare, F. Kenneth, **Climatic classification.** (In: **Essays in Geography.** [London, n.d.] Chap. 7, p. 111–134. 3 figs., 32 refs. equations.)—Summarizes and discusses from the geographical aspect the classifications of W. Köppen, W. Gorczyński, and C. W. Thornthwaite and criticisms of them by other authors. *Subject Heading:* **1. Climatic classification.**—*C.E.P.B.*

3.3–224 551.585.7

Hovmöller, Ernest, **International Congress on Alpine Meteorology.** *Tellus*, 3(2):114–115, May **1951.** ref. **MH-BH**—A concise account of the meeting at Milan and Turin on Sept. 20–22, 1950, wherein a number of papers on mountain meteorology (especially of the Alps) were read and numerous geophysicists from Europe and America attended. The gist of each paper read at the conference is given briefly. The conference was instigated by Prof. Mario Bossolasco, editor of *Geofisica Pura e Applicata* and director of the Instituto Geofisico Italiano at Milan. *Subject Headings:* **1. Mountain meteorology 2. International Congress on Alpine Meteorology 3. Alps.**—*M.R.*

## BIOCLIMATOLOGY

(*See also items:* 3.3–84, 3.3–166, 3.3–189)

3.3–225 551.586:58

Sauberer, Adele, **Die Verteilung rindenbewohnender Flechten in Wien, ein bioklimatisches Grosstadtproblem.** [The distribution of bark-dwelling lichens in Vienna, a bioclimatic urban problem.] *Wetter und Leben*, 3(5–7):116–121, June **1951.** 16 refs. **MH-BH**—Lichens as symbiotes are very susceptible to external conditions, especially sulphuric acid, and do not grow in dense towns. In Vienna five regions are distinguished: central city, lichens only in large parks; large gardens with traces of immature specimens; western suburbs with poor specimens; outer parks with normal growth; Vienna forest with rich growth. Other towns are compared. *Subject Headings:* **1. Plant ecology 2. Urban influences 3. Lichens 4. Vienna, Austria.**—*C.E.P.B.*

3.3–226 551.586:58

Tschermak, Leo, **Die natürliche Holzartenverbreitung im Umkreis von Wien in ihrer Abhängigkeit vom Klima.** [The natural distribution of trees in the neighborhood of Vienna as dependent on climate.] *Wetter und Leben*, 3(5–7):103–108, June **1951.** 22 refs. **MH-BH**—The outer slopes of the Alps to the west have an oceanic climate, those to the east a continental ("Pannonian") climate. This and the subsoil cause differences in species of trees. Forest composition in different districts is described in detail. Spruce in nature occurs in mixed forest; artificial pure spruce plantations do not do well. *Subject Headings:* **1. Plant ecology 2. Forestry 3. Vienna, Austria.**—*C.E.P.B.*

3.3–227 551.586:551.594.11:550.387

†Lossnitzer, H., **Die Bedeutung des elektromagnetischen Erdfeldes in der Bioklimatologie.** [The importance of the terrestrial electromagnetic field in bioclimatology.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(3):297–307, **1951.** 4 figs., 28 refs. German, English and French summaries p. 297. **MH-BH**—The earth's electric field is

considered to be an important factor in agglutination of the blood. The importance of the earth current as an indicator is stressed and some autographic records are illustrated and discussed in relation to weather conditions. *Subject Headings:* **1. Atmospheric electricity 2. Earth currents 3. Medical climatology 4. Circulatory system.**—*C.E.P.B.*

3.3–228 551.586:612:599.9

Malysheva, A. E., **Radiatsionnoe okhlazhdenie cheloveka i zashchitnaia rol' odezhdy.** [Radiational cooling of man and the protective role of clothing.] *Gigiena i Sanitariia*, No. 4:24–30, April **1951.** 4 tables. **DLC**—Individuals with varying layers of clothing radiated to a cold source which was at a surface temperature of 4°C. The angular distance between the radiating bodies was varied from 0.14 to 4.85 steradians and the temperature of the outer surface of the clothing of various parts of the skin and of the nasal mucosa was measured. With one and three clothing layers the skin temperature of the back declined 1.8° and 1.4°C as the angular distance was increased from 0.14 to 4.85 steradians; the temperature of the outer clothing surface fell 2.4 and 4.6°C, respectively. With aluminum foil 14$\mu$ thick, attached to the outside of the clothing, the skin temperature of the back varied ±0.5°C at an angular distance of 4.85 steradians; without aluminum foil it fell 1.8 to 3.3°C. Measurement of the sensitivity of the eye to an electric stimulus (phosphene) indicated that the level of sensitivity is increased regardless of the number of layers of clothing, but that the sensitivity remained unchanged when aluminum foil was used. *Subject Headings:* **1. Physiological climatology 2. Cooling power 3. Clothing climate.**—*I.L.D.*

3.3–229 551.586:616

Berg, Hellmut, **Statistische Untersuchungen zur Meteorotropie der fulminanten Lungenembolie.** [Statistical investigations of the meteorological relation of fulminant lung embolism.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(3):308–323, **1951.** 5 figs., 7 tables, 17 refs. German, English and French summaries p. 308. **MH-BH**—Occurrences of fulminant lung embolism at Cologne 1929–1940 showed no relation to the passage of fronts, but in 1937 (sunspot maximum) a slight but statistically real, though complex relation, was found (by the *n*-method) to the magnetic character figures. This relation was not found in other years but for 1937 it was confirmed by data from other hospitals in West Germany. *Subject Headings:* **1. Medical climatology 2. Solar influences 3. *n*-method.**—*C.E.P.B.*

3.3–230 551.586:631.4(431)

Reinhard, H., **Karten zur Klimabewertung bei der Bodenschätzung in Mecklenburg.** [Charts for climatic evaluation in soil grading in Mecklenberg.] *Angewandte Meteorologie*, Berlin, 1(1):2–14, **1951.** 8 figs., 10 refs. **MH-BH**—Opens with a history of soil grading in Germany. A soil number (0–100) is assigned and to this is added a climate number based on departures from standard values of 8 elements, by means of charts prepared for the Commission for Soil Valuation. These are reproduced; they include: mean annual rainfall, rain in May–July, dryness index May–July (after E. Reichel), mean air temperature May–July, frost free period, beginning and end of temperature of 5°C. *Subject Headings:* **1. Bioclimatology 2. Plant ecology 3. Soils.**—*C.E.P.B.*

## FOREST INFLUENCES

(*See also items:* 3.3–128, 3.3–159)

3.3–231 551.588.6:551.579

Krečmer, Vladimír, **Ovlivňují lesy vodní poměry?** [Do forests influence water conditions?] *Meteorologické Zprávy*, 4(3–4):71, **1950.** **DWB**—A short discussion of the effect of forests on climatic and hydrologic conditions, especially the runoff and erosion. *Subject Headings:* **1. Forest influences 2. Runoff 3. Soil erosion.**—*M.R.*

3.3–232 551.588.6

Paulsen, Wolfgang, **Über die Einwirkungen des Baumwuchses auf das Grossklima (nach ausländischen Ergebnissen).** [On the effects of tree growth on macroclimate (from foreign

observations).] *Annalen der Meteorologie*, 4(1–6):55–62, **1951.** 12 refs. German and English summaries p. 55. **MH-BH**—A discussion of the probable climatic effect of afforestation and deforestation, with reference to the Shelterbelt project in the United States, NÄGELI's studies in Switzerland, the "desertification" of Africa through deforestation and possible large scale results of afforestation in drying swamps in U.S.S.R. Possible results of afforestation in Germany are discussed, not entirely unhopefully. *Subject Heading:* **1. Forest influences.**—*C.E.P.B.*

3.3–233 551.588.7

Hesse, Walter, **Neue städteklimatologische Untersuchungen in Leipzig. (Vorläufige Mitteilung.)** [New urban-climatological investigations in Leipzig. (Preliminary report.)] *Annalen der Meteorologie*, 4(1–6):62–64, **1951.** 17 refs. German and English summaries p. 62. **MH-BH**—Numerous auto journeys were made in and around Leipzig, and in other typical places for comparison, in 1950 to measure dust content and temperature distribution. Local stations were established for full bioclimatic observations. The results of the dust and nuclei measurements are briefly summarized. *Subject Headings:* **1. Urban influences 2. Dust 3. Atmospheric pollution 4. Leipzig, Germany.**—*C.E.P.B.*

## SYNOPTIC CLIMATOLOGY

(*See also item:* 3.3–109)

3.3–234 551.589 551.524.36

Font Tullot, Inocencio, **Las invasiones de aire caliente Africano en el Archipielago Canario.** [Invasions of hot African air in the Canary Islands.] *Revista de Geofisica*, Madrid, 9(38):334–349, Oct./Dec. **1950.** 6 figs., 3 refs. **DWB**—The climate of the Canary Islands is discussed briefly, followed by an analysis of the frequency of occurrence of hot air masses from Africa during 1941–1949 and the high temperatures at the surface (35°C to 41°C) and aloft (>35°C) that occur at such times. The various seasonal differences are taken up separately and typical synoptic charts and thermograms shown for situations where invasions occurred. They occur on the average of about 26 days a year (7 to 38), with the maximum in July and August (50% of all cases) and none in December, January and February. *Subject Headings:* **1. Synoptic climatology 2. Heat waves 3. Upper air temperatures 4. Canary Islands.**—*M.R.*

3.3–235 551.589.1

Maede, Hans, **Zur Frage der Abgrenzung des Wirkungsbereiches einer Wetterlage.** [On the question of the limit of the effective area of a weather situation.] *Zeitschrift für Meteorologie*, 5(9):268–273, Sept. **1951.** fig., 7 refs. Flohn, Hermann, **Bemerkungen zu vorstehender Arbeit von H. Maede.** [Remarks on the preceding work.] *Ibid.*, 273–274. **DWB**—The FLOHN-HUTTARY "relative specific precipitation density" (*see item* No. 11–76 in Nov. 1950 *Meteorological Abstracts*) was calculated for 9 stations in Mecklenburg for all days of $V_b$ and westerly types 1925–1939 for each season. A simple formula is developed for this index; it is proposed that maximum be taken as 100 and limit of effectiveness 25%. FLOHN comments and in general approves. *Subject Headings:* **1. Cyclone tracks 2. Precipitation distribution 3. Synoptic climatology 4. Mecklenburg, Germany. I. Flohn, Hermann.**—*C.E.P.B.*

# MISCELLANEOUS APPLICATIONS

## SOLAR INFLUENCES

(*See also item:* 3.3–150)

3.3–236 551.590.21

†Koppe, Heinrich, **Sonnenaktivität, Grosswetter und wetterbezogene Reaktionen.** [Solar activity, general weather and reactions to weather.] *Annalen der Meteorologie*, 4(1–6):87–96, **1951.** 5 figs., 36 refs. German and English summaries p. 87. **MH-BH**—Days before and after strong magnetic disturbances 1946–49 were examined for changes of various geophysical

phenomena at Brunswick. Correlation was greatest with pressure. Interdiurnal pressure change was then examined at 15 stations in Europe and results charted. Marked falls of pressure on days of magnetic storms were found in Fennoscandia exceeding 4 mb in 65°N, 30°E. This effect, as well as many bioclimatic effects, is attributed to excessive UV radiation from chromosphere eruptions. A critical discussion follows the paper. *Subject Headings:* **1. Pressure variations 2. Solar influences 3. Europe.**—*C.E.P.B.*

3.3–237 551.590.25 523.75

Ovenden, Michael W., **Recent advances in science. Astronomy—Interstellar meteors; the source of the radio emission associated with solar flares.** *Science Progress*, 39(156):658–665, Oct. **1951. DLC**—Includes: 1) an account of determination of tracks and speeds of sporadic meteors and 2) evidence of structure of sun's corona from radio observations. *Subject Headings:* **1. Meteors 2. Sun's corona.**—*C.E.P.B.*

## VISIBILITY

(*See also item:* 3.3–26)

3.3–238 551.591.1

Foitzik, Leonhard, **Zur meteorologischen Optik von Dunst und Nebel. Teil II.** [On the meteorological optics of haze and fog. Part II.] *Zeitschrift für Meteorologie*, 4(11):321–329, Nov. **1950.** 2 figs., 4 tables, 24 refs., 11 equations. **MH-BH**—Pt. I appeared in issue for Oct. 1950 (*see item* No. 2.10–185 in Oct. 1951 *Meteorological Abstracts*). In Pt. II the distribution of drop size is considered. In natural fogs the range of drop radius is very variable but all can be expressed by the normal curve

$$y = e^{-A(\log \rho / r)^2},$$

where $y$ = relative frequency, $\rho$ = radius, $r$ most frequent radius and $A$ in North Sea fog varies from 15 to 50, mean 27. The inference is that all nuclei are not equally effective and this is confirmed by experiments with a cloud chamber with different degrees of dilatation. The STRATTON-HOUGHTON function for loss of light with drops of equal radius (Pt. I) is recalculated for this drop-size distribution. *Subject Headings:* **1. Visibility 2. Haze 3. Fog 4. Drop size distribution.**—*C.E.P.B.*

3.3–239 551.591.2(52)

Yamamoto, Gi-ichi and Miura, Akira, **Opacity at Sendai.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(1):1–13, Jan. **1951.** 12 figs., 3 tables, 14 refs., 8 equations. In Japanese, English summary p. 12–13. Also in: *Tohoku University, Science Reports, 5th Ser. Geophysics*, 3(1):23–33, April, **1951.** In English. **MH-BH**—From variation of opacity with relative humidity, concentration of sulfuric acid and sea salt is estimated. Visibility is compared with lapse rate of temperature (opacity in stable air due to increase in size as well as number of nuclei). Decrease of opacity with increasing wind velocity verified. Variations with wind direction and season also studied. *Subject Headings:* **1. Visibility 2. Japan.**—*C.E.P.B.*

## OPTICAL PHENOMENA

(*See also items:* 3.3–135, 3.3–257)

3.3–240 551.593.1

Brocks, Karl and Freiesleben, H. C., **Bemerkungen zu H. C. Freiesleben, Die Strahlenbrechung in geringer Höhe über Wasserflächen. Stellungsnahme zu den vorstehenden Bemerkungen von Herrn K. Brocks.** [Remarks on H. C. Freiesleben, Refraction at a small height over water surfaces. Reply to the above remarks.] *Deutsche Hydrographische Zeitschrift*, 4(3):121–123, **1951.** 4 equations. **DWB**—A discussion of the correct expression for the vertical gradient of index of refraction. *Subject Heading:* **1. Refraction of light.**

3.3–241 551.593.5

Paul, William and Jones, R. V., **Blue sun and moon.** *Nature*, London, 168(4274):554, Sept. 29, **1951.** 2 figs., 4 refs. **DWB**—A discussion of the theory of scattering in which the

blue coloration is attributed to resonance of particles of diameter comparable with the wave length. The theoretical extinction curve agrees well with observed scattering by glass spheres. Hence for red light to be scattered more than blue, atmosphere must contain many particles of radius about 1–1.7 microns depending on refractive index. (*See also* Note, *ibid.*, p. 545.) *Subject Headings:* **1. Blue sun 2. Blue moon 3. Smoke pall**—**Sept. 1950.**—*C.E.P.B.*

3.3–242 551.593.54:551.553.12

Lossnitzer, H., **Die atmosphärische Trübung in einem Schwarzwaldtal.** [Atmospheric turbidity in a Black Forest valley.] *Baden, Landeswetterdienst, Jahresbericht mit Abhandlungen*, **1949.** p. 15–18. 4 tables, 2 refs. **DWB**—This article is a report on investigations of the relationships between atmospheric turbidity and mountain valley wind circulation at the lower end of a mountain valley. Measurements of light intensity, color value and polarization of the zenith light of the sky, and visibility measurements were carried out by means of a theodolite. *Subject Headings:* **1. Turbidity 2. Mountain and valley winds 3. Black Forest, Germany.**—*I.L.D.*

3.3–243 551.593.63

Gurlitt, Dietrich, **Gleichzeitig acht Halo-Erscheinungen über dem Schwarzwald.** [Eight halo phenomena at once over the Black Forest.] *Meteorologische Rundschau*, 4(7–8):152, July–Aug. **1951.** fig. **MH-BH**—Dec. 6, 1950, 11½–12 h, Feldberg and Freiburg. Included 22° and 46° haloes, mock suns 22° and 120° on either side of true sun, parts of circumzenithal arc, mock sun ring, upper contact are of 22° halo, and sun pillar. *Subject Headings:* **1. Halos 2. Black Forest, Germany.**—*C.E.P.B.*

3.3–244 551.593.63

**Halo phenomena at Gatow.** *Meteorological Magazine*, London, 80(950):237–238, Aug. **1951.** fig. **DWB**—Halo complex near Berlin Feb. 19, 1951, showed mock suns of 22° halo, 90° mock sun, arc of contact of 22° halo, circumzenithal arc and anthelion. *Subject Headings:* **1. Halos 2. Berlin, Germany.**

3.3–245 551.593.63

Hitzfeld, Otto J. G., **Halo-Erscheinung.** [Halo phenomenon.] *Meteorologische Rundschau*, 4(7–8):151–152, July–Aug. **1951.** fig. **MH-BH**—June 1, 1950, 14 h at Miltenberg a. Main, a colored halo (radius probably less than 22°) was surrounded by four rings of the same size, above, below and on either side, but none touching another. *Subject Headings:* **1. Halos 2. Miltenberg, Germany.**—*C.E.P.B.*

3.3–246 551.593.63

**Lunar halos.** *Marine Observer*. 21(154):216–217, Oct. **1951.** 3 figs. **MH-BH**—In Mediterranean halo of 24° radius with upper arc of contact. South China Sea, halo of 23° intersected by an arc of unknown origin passing 17½° above moon. In South Indian Ocean 22° halo with two oblique tangential arcs meeting 42° from moon, origin unknown. *Subject Headings:* **1. Halos 2. Mediterranean Sea 3. South China Sea 4. Indian Ocean.**—*C.E.P.B.*

3.3–247 551.593.63

Neuberger, Hans H., **Halos.** *Weatherwise*, 4(4):80–83, Aug. **1951.** 5 figs., ref. **MH-BH**—A discussion of the physical causes of halos. A description of various types of halos with their associated phenomena and a presentation of a method for recording scientifically the properties of observed halos. Data on the frequency of halos at State College, Penna. and photographs of halos are presented. *Subject Headings:* **1. Halos 2. State College, Pennsylvania.**—*I.L.D.*

3.3–248 551.593.63(99)

Sandner, Werner, **Halo-Beobachtungen in der Antarktis.** [Halo observations in the Antarctic.] *Polarforschung*, 3(1):20–27, **1951.** 9 tables, 3 refs. **DWB**—Tabulates material from 5 expeditions—frequency of solar and lunar halos, diurnal variation, frequencies of arcs

of contact, mock suns, parhelic circle, 46° halo, circumzenithal arcs, light pillars etc. and their combinations. *Subject Headings:* **1. Halos 2. Parhelia 3. Expeditionary data 4. Antarctic.**—*C.E.P.B.*

3.3–249 551.593.63

Shipcott, John G., **Rare optical phenomenon seen from Northolt.** *Meteorological Magazine*, London, 80(953):335–336, Nov. **1951.** fig. **MII-BH**—Observation of a mock sun or halo about 8° from sun, Aug. 5, 1951, 5:28 a.m. *Subject Heading:* **1. Halos.**

## ATMOSPHERIC ELECTRICITY

(*See also item:* 3.3–227)

3.3–250 551.594.1(494)

Israël, Hans; Kasemir, H. W. and Wienert, K., **Luftelektrische Tagesgänge und Massenaustausch im Hochgebirge der Alpen. Die luftelektrischen Verhältnisse am Jungfraujoch (3472 m) I.** [Diurnal variation of atmospheric electricity and mass exchange in the high mountains of the Alps. Atmospheric electric conditions on Jungfraujoch (3472 m) I.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 3(5):257–381, **1951.** 11 figs., 7 tables, 24 refs., 6 equations. German, English and French summaries p. 357–359. **MH-BH**—In summer, in fine weather the lowland continental type of diurnal variation prevails even at 3472 m, the curve of potential gradient being nearly inverse to those of conductivity and vertical current. In autumn the oceanic type prevails, potential gradient and vertical current varying together. In summer, but not in autumn, diurnal variation of columnar resistance agrees closely with local air resistance. To explain these results authors assume that in summer vertical mass exchange extends to crest of Alps (compare curve for vapor pressure) but in fall it does not reach so high. Hourly data are set out fully for May 30–July 30 and Oct. 5–Nov. 1, 1950. *Subject Headings:* **1. Atmospheric electricity 2. Mountain meteorology 3. Jungfraujoch, Swiss Alps.**—*C.E.P.B.*

3.3–251 551.594.1/2

Yeh, Tu-cheng, **Some measurements of the atmospheric electrical potential gradient over Mei-Tan.** *Chinese Geophysical Society, Journal*, 2(2):147–157, Dec. **1950.** 7 diagrs., ref. In English, Chinese summary p. 159. **MH-BH**—Frequent observations of potential were made May–Aug. 1942, 1 meter above ground. Curves show variations after dispersion of morning fog and cloud and on clear and cloudy mornings and during day under cumulus, thunder and shower clouds and mammatus. *Subject Headings:* **1. Potential gradient 2. Mei-Tan, China.**—*C.E.P.B.*

3.3–252 551.594.11:551.515.8

Falconer, Raymond E., **Some correlations between variations in the atmospheric potential gradient at Schenectady and certain meteorological phenomena.** *General Electric Research Laboratory, Project Cirrus*, Final Report, Schenectady, July 30, **1951.** p. 131–155. 8 figs., 4 tables, 8 refs. **DWB**—Radioactive point collector used at Schenectady for recording variations in the electrical potential in the atmosphere is explained. Results obtained are analyzed and a series of conclusions drawn on the correlation of atmospheric electricity with such phenomena as frontal passages, wind variation, atmospheric pressure changes, temperature, humidity, northern sky brightness, and precipitation. Schenectady observations are claimed to show fair correlations particularly in relation to frontal passages and precipitation. *Subject Headings:* **1. Potential gradient 2. Meteorological elements 3. Schenectady, New York.**—*G.T.*

3.3–253 551.594.11

Hatakeyama, H. and Utikawa, K., **The diurnal variation of the atmospheric potential gradient at the summit and the slope of Mt. Fuji.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(1):28–33, Jan. **1951.** 5 figs., table. In Japanese, English summary p. 33. **MH-BH**—The ordinary semidiurnal variation was observed (in Aug. 1947 and Jan. 1948) at 460

m, at 1290 m it was less conspicuous, while at 2800 m and summit (3778 m) gradient was greatest by day and least by night. *Subject Headings:* **1. Potential gradient variations 2. Orographic influences.**—*C.E.P.B.*

3.3–254 551.594.13:551.584.3

O'Donnell, George A and Hess, Victor F., **A comparative study of atmospheric conductivity at ground level and at one meter above ground.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:351–367, **1951.** 12 figs., 3 tables, 14 refs. English, German and French summaries p. 351–352. **DWB**—Sets out results of observations with a portable ion collector in and near New York at ground level and 1 m above. Conductivity at 1 m was the greater by day and with high conductivity. Ratios of conductivities of one sign vary with wind velocity, air pollution, nature of ground and time. Maximum conductivity in early morning, minimum 20–22 h. *Subject Heading:* **1. Electrical conductivity of air.**—*C.E.P.B.*

3.3–255 551.594.21(04)

Botley, Cicely M., **The lightning discharge in myth and legend.** *Weather*, 6(9):277–279, Sept. **1951.** 5 refs. **DWB**—Popular account of Gods of Thunder; lightning and trees; and "thunderbolts." *Subject Headings:* **1. Lightning 2. Myths.**

3.3–256 551.594.223

**Nabetrachting over de bolbliksem van Lutjewolde.** [Reconsideration of the ball-lightning at Lutjewolde.] *Hemel en Dampkring*, 49(9):158, **1951.** **DLC**—A brief note on the occurrence on 10–11 Sept. 1950. It was blue-white, stationary and probably an intense form of St. Elmo's fire with two long streamers. *Subject Heading:* **1. Ball lightning.**—*C.E.P.B.*

## AURORAS

3.3–257 551.594.5 551.593.653

Paton, James, **Auroras and luminous night clouds.** *Nature*, London, 168(4273):487–488, Sept. 22, **1951.** **DWB**—Descriptions of the usual course of a great auroral display and of luminous night clouds in Scotland, with some references to measurements of height, and velocity of clouds. *Subject Headings:* **1. Auroras 2. Luminescent clouds.**—*C.E.P.B.*

3.3–258 551.594.51 551.521.4

†Meinel, A. B., **The spectrum of the airglow and the aurora.** *Physical Society of London, Reports on Progress in Physics*, 14:121–146, **1951.** 5 figs., 8 tables, 60 refs. **DLC**—Begins with an account of the spectrum of the night sky from 3000–14,000 Å, consisting of bands due to various gases and a continuous background of uncertain origin. It is attributed to region below 120 km. The characteristic spectrum of the twilight glow is briefly described, and the spectrum of the aurora is discussed and illustrated in detail. The atomic and molecular processes involved are discussed. Temperature estimates from the aurora diverge widely. *Subject Headings:* **1. Light of the night sky 2. Auroral spectra.** *C.E.P.B.*

## ACOUSTICAL PHENOMENA

3.3–259 551.596.1:550.34

Benioff, Hugo; Ewing, Maurice and Press, Frank, **Notes on sound waves in the atmosphere generated by a small earthquake.** California Institute of Technology, Seismological Laboratory and Columbia University, Lamont Geological Observatory, Contract AF 19(122)–436 and AF 19(122)–441, Technical Report, 13, May **1951.** 7 p. graphs, 7 refs., equations. **DWB**—Sound waves from the Imperial Valley earthquake of 24 Jan. 1951 are interpreted as the result of coupling between Rayleigh waves crossing the valley and the atmosphere. An order of magnitude calculation, based on the theory of air coupled Rayleigh waves, satisfactorily explains the duration, travel time period and path of the sounds. *Subject Headings:* **1. Acoustical propagation 2. Air coupled waves 3. Earthquakes 4. Imperial Valley, California. I. California Institute of Technology, Seismological Laboratory. II. Columbia**

**University, Lamont Geological Observatory. III. Contract AF 19(122)–436. IV. Contract AF 19(122)–441.**—*Author's abstract.*

3.3–260 551.596.5

Ashmore, S. E., **The loudness of thunder.** *Weather*, 6(9):285, Sept. **1951. DWB**—Discussion (without solution) of variations in apparent loudness of thunder. *Subject Heading:* **1. Thunder.**

## SUNSPOTS

3.3–261 523.74

Gleissberg, W., **Eine Modifikation der langfristigen Sonnenfleckenprognose.** [A modification of the long-range sunspot forecast.] *Zeitschrift für Astrophysik*, 29(1):1–8, **1951.** table, 9 equations. Summary in English and German p. 1. **DLC**—In 1941 author described a method of predicting the character of the next sunspot cycle from the two preceding cycles. He gives improvements and two alternative forecasts of next cycle (minimum 16.5, March 1955 or 13.7, July 1955; maximum 160, Aug. 1958 or 140, Aug. 1959). *Subject Heading:* **1. Sunspot cycles.**—*C.E.P.B.*

3.3–262 523.74

Gleissberg, W. and Kiral, A., **Prognose für das kommende Sonnenfleckenminimum.** [Forecast for the coming sunspot minimum.] *Zeitschrift für Astrophysik*, 28(1):17–27, **1950.** 3 tables, 29 equations. English and German summaries p. 17. **DLC**—An equation is developed relating minimum sunspot number smoothed over 4 cycles to mean number over 4 cycles. From this, when maximum is past, minimum can be forecast with considerable accuracy. The next minimum is expected to exceed 9 and to come not more than 18 months after smoothed Wolf number falls below 38. *Subject Heading:* **1. Sunspots.**—*C.E.P.B.*

3.3–263 523.74

**Large sunspot group seen through fog.** *Nature*, London, 167(4241):221, Feb. 10, **1951. DLC**—On Jan. 29 and 30, 1951 a spot group central on the sun's disk was seen in London with the unaided eye through fog. *Subject Heading:* **1. Sunspots.**

3.3–264 523.74/5:001

*Markowitz, William, **Sunspot areas and numbers as indices of solar activity.** *U. S. Naval Observatory, Circular* No. 30, May 11, **1951.** 12 p. tables, charts. **DWB**—Includes definitions of terms discussed (sunspot areas, sunspot numbers) and a list of publications devoted to sunspot data (by U. S. Naval Observatory, Mount Wilson, Royal Observatory, Greenwich, Zurich and Central Radio Propagation Laboratory of National Bureau of Standards). Sample graphs show data since 1938 and table shows comparison of results for each year 1938–1949 with each other and with the mean. Relations between areas and counts are described. A fixed ratio exists between the two. Hence, either may be used if short period variations are averaged out. *Subject Headings:* **1. Sunspots 2. Solar activity 3. Definitions.**—*M.R.*

3.3–265 523.74

Righini, G. and Godoli, G., **Sui numeri caratteristici dell'attività solare.** [On the characteristic numbers of solar activity.] *Annali di Geofisica*, 3(4):501–513, Oct. **1950.** 9 figs., 2 tables, 4 refs. **MH-BH**—Many charts are presented to show the relation between characteristic sunspot number and area of hydrogen and calcium filaments and flocculi. Mean monthly values of these elements (for 1942 to 1949) are given in tables, based on observations made at the Arcetri Astrophysical Observatory. It is shown that the characteristic number does not vary directly with area, but a linear relation can be obtained by using an altered scale. *Subject Headings:* **1. Sunspots 2. Arcetri Astrophysical Observatory.**—*M.R.*

3.3–266 523.75

Müller, Rolf, **Über die Beobachtung einer hellen Randeruption.** [On the observation of a bright limb-eruption.] *Naturwissenschaften*, 38(15):348–349, Aug. **1, 1951.** 2 figs. **DWB**

—An account of the solar protuberance of April 25, 1951. It is doubtful whether any particles from it reached the earth. *Subject Heading:* **1. Solar flares.**—*C.E.P.B.*

3.3–267 523.755

Jaeger, J. C. and Westfold, K. C., **Equivalent path and absorption for electromagnetic radiation in the solar corona.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3(3):376–386, Sept. **1950.** 10 figs., 4 refs., 29 equations. **DWB**—Neglecting the influence of possible magnetic fields and assuming that the electron density in the corona is spherically symmetrical, the author calculates the trajectories, the equivalent path and absorption of rays in the frequency range 20–100 Mc/s in the solar corona. The representation of electron density by a single inverse power law is discussed. The "double humped" curve, which represents "unpolarized bursts" of solar noise on frequencies of 60–100 Mc/s, is interpreted as the superposition of a direct and echo signal and inferences regarding the height of the source of solar noise in the corona and its location on the solar disk are made. *Subject Heading:* **1. Sun's corona.**—*I.L.D.*

# PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON THE CLIMATES OF PARAGUAY, URUGUAY AND ARGENTINA

By: *Mary L. Rice*

## EXPLANATORY NOTE

This is the first in a series of three bibliographies on the climatology of South America. The second will include the countries along the west coast of that continent (Colombia, Ecuador, Peru, Bolivia and Chile) and the third will be devoted to the remaining countries in the northeast (Brazil, the Guianas and Venezuela).

For purposes of organization, the material in this bibliography has been divided into five sections: 1) works dealing with South America as a continent, 2) works dealing with the Rio de la Plata region and the coasts of Uruguay and Argentina as a whole and 3), 4) and 5) works dealing with Paraguay, Uruguay and Argentina individually. The items in each of the five sections are arranged alphabetically by author.

Examination of bibliographies contained in items 3C–18 and 3C–236 to 3C–238 reveals the great quantity of material available on this subject and indicates the need for a rigid selection of items to be included in this bibliography.

The Outline of Contents gives a perspective of the subject matter treated. These subjects are arranged under the five above mentioned sections, in the general order followed by the Universal Decimal Classification system.

We wish to express our appreciation to Sr. Carlos Nuñez Monasterio, director of the Servicio Meteorológico Nacional of Argentina and to the British Meteorological Office for their assistance.

## OUTLINE OF CONTENTS

### South America (General)

**General Meteorology**
Bibliographies, 3C–8
**Data**
Climatic data, 3C–1, –7, –13, –18, –26
Precipitation data, 3C–10
Cloud data, 3C–22
Visibility data, 3C–22
Graphical presentation, 3C–9
**Analysis and Forecasting**
Synoptic analysis, 3C–14
Long range forecasting, 3C–3
Methods of forecasting
Correlations, 3C–3
**General Circulation,** 3C–14
Atmospheric circulation, 3C–4
Zonal circulation, 3C–20
**Pressure Systems, Fronts and Air Masses**
Air masses, 3C–19, –21, –24
Fronts, 3C–19
**Temperature**
Temperature regime, 3C–9, –16
Temperature variations, 3C–28
Diurnal temperature variations, 3C–15
Temperature extremes, 3C–5
Cold poles, 3C–5
**Atmospheric Pressure**
Pressure variations, 3C–20
**Fog, Clouds and Hydrometeors**
Humidity
Aridity zones, 3C–25
Precipitation, 3C–27
Precipitation regime, 3C–21
Precipitation distribution, 3C–10
Rainfall distribution, 3C–11
**Climatology,** 3C–6, –8, –16 to –18
Climatic regions, 3C–1, –2
Climatic types, 3C–6
Climatic effects, 3C–23
Bioclimatology
Plant ecology, 3C–23
Orographic effects, 3C–4, –21
Marine climatology, 3C–26
Pilot guides, 3C–26
Aeronautical climatology, 3C–12
Airports, 3C–12
Montevideo–Santiago air route, 3C–12

## South America (Regional)

**Meteorological Services,** 3C–42
**Data**
Climatic data, 3C–34 to –36, –40, –41
**Analysis and Forecasting**
Synoptic analysis, 3C–33, –40, –45
Synoptic studies, 3C–33
**Atmospheric Structure**
Atmospheric pollution, 3C–43
Volcanic dust, 3C–43
**Temperature**
Upper air temperatures, 3C–32
**Winds**
Gales, 3C–44
Pamperos, 3C–37
Upper air winds, 3C–44
**Climatology,** 3C–30, –31, –38, –39, –41
Marine climatology, 3C–29, –34 to –36
Pilot guides, 3C–29, –34, –36
Aeronautical climatology, 3C–33, –46
Buenos Aires–London air route, 3C–32

## Paraguay

**Data**
Annual reports, 3C–70
Climatic data, 3C–46, –56, –64, –67, –69, –70
Observational data, 3C–54, –66, –67
Long period records, 3C–49, –53, –61
Temperature data, 3C–71, –73
Precipitation data, 3C–59, 3C–61, –71, –73
Periodicities, 3C–49
**Temperature,** 3C–59
Temperature effects, 3C–47, –50
**Fog, Clouds and Hydrometeors**
Clouds, 3C–62
Precipitation, 3C–48, –49
Precipitation normals, 3C–51
Rainfall, 3C–63
**Climatology,** 3C–46, –48, –52, –55, –57 to –60, –62 to –65, –68, –72, –73
Bioclimatology
Agricultural climatology and meteorology, 3C–47, –50
Plant ecology, 3C–62
Plant resistance, 3C–47, –50
Medical climatology
Nosography, 3C–46, –65

## Uruguay

**Meteorological Services and Observation**
Meteorological services, 3C–42, –87
Meteorological observatories and stations, 3C–100, –112
Observation techniques, 3C–90
**Data**
Annual reports, 3C–113
Climatic data, 3C–92, –101, –103, –109, –110
Observational data, 3C–88, –94
Long period records, 3C–96, –98, –99, –105, –107
Precipitation data, 3C–102, –106
Temperature data, 3C–102
Wind data, 3C–88, –91, –95
**Analysis and Forecasting**
Weather forecasting, 3C–79
Long range forecasting, 3C–84
Periodicities, 3C–84
Weather lore, 3C–79
**Temperature,** 3C–89
Temperature normals, 3C–77
Temperature variations, 3C–105
Seasonal temperature variations, 3C–80
**Wind**
Wind variations, 3C–91
Wind frequencies, 3C–95
Gales, 3C–99
Pamperos, 3C–82
**Fog, Clouds and Hydrometeors**
Fog frequencies, 3C–94
Fog intensity, 3C–94
Seasonal precipitation distribution, 3C–104
Precipitation frequencies, 3C–96
Precipitation intensity, 3C–96
Drought, 3C–106, –107
Drought frequency, 3C–108
Rainfall, 3C–89, –93
Rainfall normals, 3C–75
Seasonal rainfall variations, 3C–80
Rainfall frequencies, 3C–81
Hail, 3C–90, –93
Hail structure, 3C–97
Hail size distribution, 3C–76
Hail distribution, 3C–76, –97
**Hydrology**
Runoff, 3C–107
**Climatology,** 3C–74, –77, –83, –89, –92, –100, –103
Climatic normals, 3C–98, –101
Climatotherapy, 3C–85
Agricultural climatology, 3C–78, –108
Animal husbandry, 3C–108
Marine influences, 3C–77
**Miscellaneous Phenomena and Applications**
Optical phenomena, 3C–86
Definitions, 3C–86
Skylight color, 3C–86
Oceanographic research, 3C–76

## Argentina


**General**
- Bibliographies, 3C–225, –236 to –238
- Textbooks, 3C–158, –165
- Periodicals, 3C–203
- History of meteorology, 3C–167, –210, –234
- Biography, 3C–210

**Meteorological Services and Observation**
- Meteorological services, 3C–42, –115, –156, –210, –228, –234
  - Aeronautical meteorological services, 3C–121
  - Observatories, 3C–216, –233
  - Meteorological stations, 3C–216
- Methods of observation and computation
  - Statistical analysis, 3C–154
  - Computation tables, 3C–227
    - Dew point tables, 3C–227
  - Temperature calculation, 3C–209
  - Precipitation calculation, 3C–209
  - Graphical presentation, 3C–134
    - Nomograms, 3C–117, –209
    - Climatic wind roses, 3C–211

**Data**
- Monthly weather reports, 3C–128
- Annual reports, 3C–115
- Climatic data, 3C–116, –119, –120, –124, –128, –154, –155, –228
  - Fragmentary climatic data, 3C–128, –224
- Observational data, 3C–120, –125, –126, –168, –198
- Long period records, 3C–116, –201, –212, –219
- Precipitation data, 3C–149, –172, –201, –217, –221, –246
- Temperature data, 3C–197, –201, –246
- Upper air wind data, 3C–220, –232
- Phenology, 3C–124, –158, –200, –204

**Analysis and Forecasting**
- Synoptic analysis, 3C–244
  - Synoptic forecasting, 3C–235
  - Synoptic meteorology, 3C–165
- Long range forecasting, 3C–179, –180, –182
- Extended forecasting, 3C–146, –147, –230
- Weather forecasting, 3C–214
- Objective forecasting techniques, 3C–118
- Statistical forecasting, 3C–251
- Methods of forecasting
  - Periodicities, 3C–147
  - Periodogram analysis, 3C–162
  - Correlations, 3C–179, –251
- Elements forecast
  - General circulation forecasting, 3C–163
  - Temperature forecasting, 3C–236
    - Frost forecasting, 3C–186
  - Precipitation forecasting, 3C–164
- Miscellaneous
  - Synoptic charts
  - Forecast verification
  - Artificial precipitation

**General Circulation,** 3C–132
- Atmospheric circulation, 3C–156, –161

**Atmospheric Composition and Structure,** 3C–173, –239
- Atmospheric pollution, 3C–148, –184
  - Urban air, 3C–184
- Aerological studies, 3C–232

**Dynamics of the Atmosphere,** 3C–247

**Pressure Systems, Fronts and Air Masses**
- Diurnal pressure variations, 3C–254
- Atmospheric disturbances, 3C–130, –231
  - Structure of disturbances, 3C–235
  - Depressions, 3C–180
  - Anticyclones, 3C–180
  - Air masses, 3C–173, –190
  - Air mass characteristics, 3C–211
  - Line squalls, 3C–178

**Radiation**
- Solar radiation, 3C–146, –147, –161, –182, –241
- Solar constant, 3C–242, –243

**Temperature,** 3C–145
- Temperature variations, 3C–245
- Temperature effects, 3C–199
- Extreme temperatures, 3C–131
- Frost, 3C–159, –215
- Frost free periods, 3C–157
- Frost frequencies, 3C–249
- Vertical temperature gradient, 3C–253
- Upper air temperatures, 3C–173

**Wind**
- Special winds, 3C–152, –153
  - Föhn winds, 3C–152
  - Pamperos, 3C–178
  - Zonda, 3C–152, –187
  - Sirocco, 3C–152
- Dust storms, 3C–244
- Wind erosion, 3C–168, –240
- Climatic wind roses, 3C–211

**Fog, Clouds and Hydrometeors**
- Aridity, 3C–188
- Evapotranspiration, 3C–136
- Hydrometeors, 3C–130
  - Precipitation, 3C–129, –175
  - Precipitation distribution, 3C–172, –206
  - Precipitation variations, 3C–202
- Global precipitation compensation, 3C–229
- Drought, 3C–129, –149, –176
- Rainfall, 3C–145, –151, –162
- Rainfall normals, 3C–219
- Rainfall distribution, 3C–183
- Rainfall variations, 3C–229
- Snow studies, 3C–144
- Hail distribution, 3C–181
- Hail damage, 3C–143
- Hailstorms, 3C–191

**Hydrometeorology,** 3C–188
- Ground water, 3C–250

**Climatology,** 3C–114, –119, –122, –134, –135, –137, –142, –154 to –156, –168 to –171, –175, –176, –185, –195, –196, –198, –208, –218, –221 to –224, –226, –236 to –238, –240, –248, ₮252

Climatic regions, 3C–145, –154, –169, –175, –195, –207
Climatic changes, 3C–140, –188, –193, –194, –213
Quaternary climates, 3C–140, –141
Geochronology, 3C–141
Geological climates, 3C–194
Polar migration, 3C–194
Microclimatology, 3C–139, –249
Climatic classification, 3C–136, –137, –171, –192, –193
Thornthwaite's classification, 3C–160
Bioclimatology, 3C–190
Public health, 3C–148
Agricultural climatology and meteorology, 3C–133, –139, –157, –158, –166, –186, –192, –207, –226, –249
Plant resistance, 3C–215
Plant ecology, 3C–135, –207, –222
Growing season, 3C–157
Mountain meteorology, 3C–177, –197, –233
Orographic effects, 3C–132, –202
Marine climatology, 3C–122, –123
Pilot guides, 3C–122
**Miscellaneous Phenomena**
Sunspots, 3C–147
Solar faculae, 3C–182
Visibility, 3C–126
Twilight duration, 3C–117
Lightning, 3C–189
**Applications**
Botany, 3C–160, –176, –183
Oceanography
Sea ice formation, 3C–212
Hydrology, 3C–150
Aeronautics, 3C–165
Soils, 3C–160, –226
Soil conservation, 3C–168
Agriculture, 3C–124
Viticulture, 3C–143
Horticulture, 3C–199, –200, –204
Forestry, 3C–176
City planning, 3C–148
Geography, 3C–142, –175, –196, –225

# BIBLIOGRAPHY ON THE CLIMATES OF PARAGUAY, URUGUAY AND ARGENTINA

## I. SOUTH AMERICA (GENERAL)

**3C–1** 551.58(8)

†§Alisov, B. P., **Klimaticheskie oblasti zarubezhnykh stran.** [Climatic regions of foreign countries.] Moscow, Gosizdat., **1950.** 350 p. 99 figs., tables, biblio. p. 346–350. **DLC**—Chap. VI (p. 164–184. 5 charts, tables) deals with the climatic regions of South America. General discussion of factors which determine the climate of this area followed by description of each of five climatic zones. Illustrated with graphs and tables. (*Same item* as No. 2.10–155 in Oct. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Climatic regions 2. South America.**

**3C–2** 551.582.1(8)

Ashton, Edwin George, **South America; an introductory survey.** London, Harrap, **1950.** 271 p. 55 figs. (incl. maps), photos. **DLC**—In Chap. III (p. 34–36), on "Climate," the continent is divided into 3 areas: dry zone, winter rain regions and summer rain regions, and the climate of each is described. Graphs show annual march of temperature and rainfall at specified localities. *Subject Headings:* **1. Climatic regions 2. South America.**

**3C–3** 551.509.33:551.513.7

Bliss, E. W., **Correlation of world weather and a formula for forecasting the height of the Paraná River.** *Royal Meteorological Society, Memoirs,* 2(14):39–45, **1928.** fig., 3 tables. **DWB**—St. Vincent temperature, South Rhodesia rainfall and height of Paraná are correlated with numerous other meteorological series. A formula for forecasting in Sept. the height of the Paraná for Nov. to May is based on pressure at Darwin and Samoa. (*Same abstract* as No. 2B–71 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Correlations 3. South America.**—*C.E.P.B.*

**3C–4** 551.513 551.557.2(8)

Boffi, Jorge Alberto, **Effect of the Andes Mountains on the general circulation over the southern part of South America.** *American Meteorological Society, Bulletin,* 30(7):242–247, Sept. **1949.** 4 figs., 4 refs. **MH-BH**—The effect of the Andes on the circulation over southern South America is shown by stream lines at 1,346 km from pilot balloon ascents. The loss of absolute vorticity over the Andes is regained by turning the W-wind towards lower latitudes. The same pattern is deduced from cyclone tracks. Cyclones moving NE tend to decrease in intensity, those moving SE to increase. Circulation differs from that over North America. English version of an article originally written in Spanish (*see item* No. 2.2–67 in Feb. 1951 *Meteorological Abstracts*). (*Same abstract* as No. 2.7–76 in July 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Atmospheric circulation 2. Orographic effects 3. South America.**—*C.E.P.B.*

**3C–5** 551.524.37

Bustos Navarrete, Julio, **The cold pole of South America.** *Monthly Weather Review*, 61(10):302, Oct. **1933. DWB**—Observations made over a long period of time in Chile and Argentina show that a cold pole exists in South America. The region is located in the interior of the continent and is bounded by the stations of Chos Malal, Lanquimay, Las Lajas and Bariloche. Here minimum temperatures of −32°C in standard shelters and −40°C in the open, with clear sky, have been recorded. Invasions of polar air are attended by these low temperatures. *Subject Headings:* **1. Cold poles 2. Temperature extremes 3. South America.**

**3C–6** 551.582(8)

Carbonell y Migal, Arturo, **Geografía física.** [Physical geography.] 7th ed. Montevideo, A. Monteverde, **1944.** 356 p. 92 figs., refs. **DWB**—A general work. Chap. IX (p. 255–269) treats of climate. A discussion of the astronomical and geographic elements of climate is followed by a description of various climatic types with illustrations from various parts of the world, including South America. *Subject Headings:* **1. Climatology 2. Climatic types 3. South America.**

**3C–7** 551.506.3(8) 551.582.2(8)

*Clayton, Henry Helm (*ed.*), **World weather records.** *Smithsonian Miscellaneous Collections*, Vols. 79 and 90. **1927–1934.** chiefly tables. **DWB**—An alphabetical arrangement has been followed in presenting the data—first by large areas, then by country within the area and, finally, by station for each country. The data for Argentina, Paraguay and Uruguay will be found in the section on South America. Precipitation, temperature and pressure are usually included. Coordinates and altitudes are given for each station. (*See item* **3C–56** below.) *Subject Headings:* **1. Climatic data 2. World weather records 3. South America. I. Smithsonian Miscellaneous Collections.**

**3C–8** 551.582:016(8)

†De Le Vin, Margaret Morris (Welch), **Bibliography on the climate of South America.** *Monthly Weather Review, Supplement* No. 18, **1921.** 42 p. **DWB, DLC**—A classified bibliography of more than 1000 entries. Includes references to material on South America as a whole, to each country and to the Guianas and the Falkland Islands, with the section devoted to Brazil being the most extensive. Climatology, meteorology and allied fields are covered. Earliest imprint is 1714, latest 1919. Sources are in English, French, Spanish, Portuguese and Italian. The numerous, brief annotations are in English. Some of the references appear in this bibliography. *Subject Headings:* **1. Climatology 2. Bibliographies 3. South America.**

**3C–9** 551.501.6:551.524.2(8)

*Franze, Bruno, **Eine Karte des Temperaturverlaufs in Südamerika.** [A chart of the temperature variations in South America.] *Petermanns Geographische Mitteilungen*, 75(3/4):62–65, **1929.** table. Pt. 2, *Ibid.*, 75(5/6):132–135, **1929.** chart (bound at end of vol.). **DLC**—An elaborate chart is presented showing the mean and extreme temperatures for 1910–1919 at 61 stations in South America of which a score are in Argentina, Uruguay and Paraguay. The data are not presented in the classical form of isotherms, but by bar-charts showing for each month of the year the mean and extreme and average extreme, maximum and minimum as well as the mean temperature, thus, giving at a glance the average diurnal and annual variation and the annual course of each of these parameters as well as the extreme variability in each month for each station. The data for each station are presented in the chart in the approximate place where the station lies and the chart is large enough for the data to be read easily. This is the first chart of this kind which has come to our attention. Recently, this method of presentation has become quite popular among the more analytical climatologists. In the second part of the article, the author discusses the temperature variability of South America in general and then in detail for each of the zones: 1) tropical, 2) subtropical, 3) temperate east coast, 4) west coast and 5) the southern islands. The only deficiency in these diagrams arises from the lack of a printed temperature scale in each diagram. Any of the 7 values for each month (84 for the year) must be "scaled off" to determine the exact value for each, although the printing of the chart on coordinate paper facilitates this operation. *Subject Headings:* **1. Temperature regime 2. Graphical presentation 3. South America.**—*M.R.*

**3C–10** 551.577.2(8)

†*Franze, Bruno, **Die Niederschlagsverhältnisse in Südamerika.** [Precipitation conditions of South America.] *Petermanns Geographische Mitteilungen, Ergänzungsheft* No. 193, **1927.** 79 p. fold. chart (bound at end of vol.), tables, numerous refs. **DLC.** Review by H. A. Matthews in *Geographical Journal*, London, 74(5):474–477, Nov. **1929.** chart (after Franze), refs. **DLC**—A thorough analysis of precipitation distribution in South America. The separate chapters deal with the different political divisions as well as the continent as a whole. A critical examination of the data is presented and the peculiarities and problems of rainfall distribution are pointed out. Tables present data for each country with those from Argentina, Chile and Peru being the most extensive.

Monthly and yearly averages, number of years of record and the period of record, geographic coordinates and height are usually given for each station. Monthly averages are also given for some stations. One chart shows annual precipitation and location of stations, another shows the seasonal distribution of rainfall by the use of graphs of monthly precipitation for selected stations. *Subject Headings:* **1. Precipitation distribution 2. Precipitation data 3. South America. I. Matthews, H. A.**

**3C–11** 551.577.21(8)

Gooze, Charles and Jones, Clarence F., **The seasonal distribution of rainfall in South America.** *Geographical Society of Philadelphia, Bulletin,* 26(2):93–115, April **1928.** 5 charts, 7 refs. **DLC**—Discusses first the effect of relief and prevailing winds on rainfall. These two factors plus the influence of water bodies, insolation and vegetation divide South America into a number of different rainfall divisions. The seasonal distribution in each of these areas is considered. Annual and seasonal isohyetal charts are included. *Subject Headings:* **1. Rainfall distribution 2. South America.**

**3C–12** 551.586:551.582:656.7(8)

§Great Britain. Meteorological Office, **Aviation meteorology of South America.** London, H.M. Stationery Office, **1948.** 50 p. 20 figs., 4 tables, 13 refs., 4 append. M.O. 496a. **DWB**—A general treatment of flying weather in South America from the synoptic point of view. Discussion of general circulation, air masses and seasonal differences in various sections of South America. Special consideration of Montevideo-Santiago airports. Tables of surface and upper air data for major airports along the route (Montevideo, Buenos Aires, Paraná, Mendoza, Santiago and Valparaiso). Ceiling and visibility data, and synoptic charts for two series as affecting Montevideo–Santiago air route are given. Map of South America shows main airports. (*Same abstract* as No. 3–125 in March 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Aeronautical climatology 2. Airports 3. Montevideo–Santiago air route 4. South America.**—*M.R.*

**3C–13** 551.506.3(8) 551.582.2(8)

Great Britain. Meteorological Office, **Réseau Mondial. Monthly and annual summaries of pressure, temperatures, and precipitation at land stations, generally two for each ten-degree square of latitude and longitude, [1910–1932].** London, H.M. Stationery Office, **1920–1940.** 23 Vols. fold. maps, tables. Title varies. **DWB**—This scheme for representation of the meteorology of the globe resulted from recommendations made at several International Meteorological Conferences. Sir Napier Shaw presented a sample of tabular data for such a network at the 1910 conference and the work was begun under the direction of Dr. C. E. P. Brooks. The primary purpose of the publication is to aid studies of long range forecasting. The use of Réseau Mondial eliminates the necessity of acquiring vast quantities of material from various countries in order to prepare charts on a hemispheric or global scale. Originally, data were from land stations only, but beginning with the volume for 1921, data from ocean stations were also included. A bibliography of the meteorology of the globe will be found on p. xv of the Réseau Mondial 1914. The surface of the globe is divided into zones, each covering ten degrees of latitude. The zones are numbered consecutively from north to south (from lat. 80°N to lat. 70°N is zone No. 1, and lat. 60°S to lat. 70°S is zone No. 15). An identification number is assigned to each station, the first one or two digits specify the zone and the last two digits indicate its position in longitude. For the latter purpose each zone is divided into 36 squares, each extending over 10 degrees of longitude and at least two station numbers are assigned to each square. The enumeration of the stations starts from longitude 180° west of the meridian of Greenwich and proceeds eastward. In the monthly tables the data are arranged by zones, and within each zone, in the order of the identification numbers of the stations. The data have been transcribed in most cases from the publications received in the Library of the Meteorological Office of Great Britain. Particulars of these sources are found at the end of the volume. Data for approximately 35 South American stations will be found in zones 6, 8, 9, 10, 11, 12, 13 and 14. *Subject Headings:* **1. Climatic data 2. World weather records 3. Réseau Mondial 4. South America. I. International Meteorological Committee. II. Brooks, Charles E. P.**

**3C–14** 551.513 551.509

Giuffra, Elzear Santiago, **La circulación de la atmósfera en el hemisferio sur.** [Atmospheric circulation in the Southern Hemisphere.] *Revista Meteorológica,* Montevideo, 2(6):123–198, April **1943.** 45 figs., refs. **DWB**—An attempt to apply the modern concepts of the Norwegian or Bergeron school of meteorology and weather analysis to the conditions existing in the temperate zone of South America. The main part of the work consists of a well illustrated discussion of the basic principles of air masses, fronts, cyclonic systems and attending weather conditions. Numerous schematic diagrams and charts are presented, some of which are specifically aimed at South American conditions. The peculiar astronomical, climatic and orographic conditions are discussed and then specific aspects of the different areas and elements are treated. *Subject Headings:* **1. Synoptic analysis 2. General circulation 3. South America.**—*M.R.*

**3C–15** 551.582(8)

Jefferson, Mark, **Actual temperatures of South America.** *Geographical Review*, New York, 16(3):443–466, July **1926.** 28 figs., refs. **DLC**—Using data supplied by the meteorological offices of several South American countries, the author has analyzed the principal types of weather found in Brazil, Argentina, Chile and Peru as far as temperatures are concerned. Diagrams show daily mean, maximum and minimum temperatures for selected months for a number of stations (year of record varies) and a map shows the location of the stations. Rainfall and/or humidity is given for some of the stations. *Subject Headings:* **1. Diurnal temperature variations 2. South America.**

**3C–16** 551.582(8)

Johansson, Oscar Vilhelm, **Thermische Studien über das Klima in Südamerika.** [Temperature studies on the climate of South America.] *Helsinki University, Meteorologian laitos, Mitteilungen*, No. 66, **1950.** 77 p. fig., 17 tables. In German. **DWB**—A profound, statistical treatment of the data compiled by KNOCH for the Köppen-Geiger Handbook, using various systems (such as KÖPPEN, KERNER and others) devised to smooth, reduce to sea level or homogenize the extensive (but often fragmentary) observational material for this vast continent. The annual course of mean temperature fluctuates as affected by radiation, continentality, elevation, latitude, topography, etc. The extreme southern stations are compared with similar ones in the Northern Hemisphere and stations in the tropics on both sides of the equator are compared. (*Same abstract* as 2.5–177 in May 1951, *Meteorological Abstracts.*) *Subject Headings:* **1. Climatology 2. Temperature regime 3. South America.**—*M.R.*

**3C–17** 551.582(8)

*Kendrew, Wilfrid George, **The climates of the continents.** 3rd ed. London, Oxford University Press, **1937.** 473 p. 160 figs. (charts, graphs), numerous tables, biblio. p. 454–457. **DLC**—Pt. VI (p. 355–391) contains six chapters devoted to the climate of South America. The first chapter gives a general survey of temperature, oceanic conditions (effect of ocean currents), pressure, prevailing winds and rainfall. The remaining chapters describe the climate of the various geographical or political divisions. Data are presented in charts and tables. A map shows the location of places mentioned in the text. *Subject Headings:* **1. Climatology 2. South America.**

**3C–18** 551.582(8)

*†Knoch, Karl, **Klimakunde von Südamerika.** [Climate of South America.] (In the **Köppen-Geiger Handbuch der Klimatologie.** Vol. 2, Pt. G. Berlin, Gebrüder Borntraeger, **1930.** 349 p. 41 figs., 18+tables, 570 refs.) **DLC.** Review by H. A. MATTHEWS in: *Geographical Journal*, London, 79(2):149, Feb. **1932**; and by MARK JEFFERSON in: *Geographical Review*, New York, 21(3): 527–528, July **1931.** **DLC**—A survey of the climate of South America and of the individual climatic variables of temperature, wind, humidity, cloudiness, precipitation and thunderstorms is presented. This is followed by a detailed treatment of each country—first, those of the west coast including Venezuela and Trinidad and second, the remaining countries including the Falklands. Next, KÖPPEN discusses his system of classification. This is followed by a section devoted to tables, among which are: 1) monthly and annual means of temperature and rainfall at 216 stations; 2) annual rainfall at 260 more and 3) monthly and annual pressure at 80 stations. The charts, scattered throughout the text, include: 1) temperature at surface and sea level, anomalies and annual range; 2) pressure and pressure amplitude; 3) mean cloudiness for summer and winter and 4) rainfall for every month and the year. The 570 references in the bibliography are classified (general and for each country in the order in which they are discussed) and the authors are arranged alphabetically in each class. *Subject Headings:* **1. Climatology 2. Climatic data 3. South America. I. Matthews, H. A. II. Jefferson, Mark III. Köppen, Wladimir IV. Geiger, Rudolf.**

**3C–19** 551.515.8(8)

Preston, James E., **Air masses and fronts in South America.** *Geographical Review*, New York, 29(1):132–135, Jan. **1939.** 2 charts, refs. **DLC**—A description of the climatic features of South America in terms of air masses and fronts. These are divided into equatorial air masses, tropical air masses and polar air masses, and the source regions, lines of movement and normal positions of the fronts are identified. Typical synoptic charts for January and July are included. *Subject Headings:* **1. Air masses 2. Fronts 3. South America.**—*From author's abstract.*

**3C–20** 551.513

Ramamurti, K. S., **Long-term longitudinal oscillation of the atmosphere in the vicinity of South America.** *Journal of Meteorology*, 6(1):63–65, Feb. **1949.** fig., 5 tables, 10 refs., 7 equations. **DWB**—Statistical analysis of pressure data from 19 stations in South America, grouped according to latitude, to show meridional oscillations in pressure from year to year. The author claims that such variations are significant and hence may be used as an index to attempt forecasting winter precipita-

tion in India. (*Same abstract* as No. 3–53 in March 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Zonal circulation 2. Pressure variations 3. South America.**—*M.R.*

**3C–21** 551.579

Ratisbonna, Leandro Riedel and Serra, Adalberto Barranjard, **Os regimens de chuva na America do Sul.** [Rainfall regimes of South America.] *Revista Meteorológica*, Montevideo, 1(2):40–52, April **1942.** 6 charts. In Portuguese. **DWB**—A careful division of South America into regions with different rainfall regimes, taking into consideration not only the effects of orography but also the seasonal interaction of tropical and polar air masses. In addition to a map delineating the rainfall regimes, the article includes seasonal isohyetal maps and a map showing the principal air masses of South America. *Subject Headings:* **1. Precipitation regime 2. Orographic effects 2. Air masses 4. South America.**—*R.S.Q.*

**3C–22** 551.506:551.576:551.591(8)

*Rigby, Malcolm, **Cloud, ceiling and visibility data for North and South America.** *U. S. Weather Bureau, Special Report* No. 88, **1942** [n. p.] chiefly tables. Also: *U. S. Air Weather Service, Report* No. 122, 1942 [n. p.]. Typewritten. **DWB**—Tables 18–21 contain data from stations along the coasts of South America for mean cloudiness, number of clear days, number of days with dense fog and percentage of observations (8 a.m.) with visibility over 10 miles. Brief commentary precedes the tabular material. *Subject Headings:* **1. Cloud data 2. Visibility data 3. South America. I. U. S. Air Weather Service II. U. S. Weather Bureau.**

**3C–23** 551.586:58

Rühle, Karl, **Die Vegetationsformationen Südamerikas in ihrer klimatischen Bedingtheit.** [South American vegetation types in relation to climatic factors.] *Petermanns Geographische Mitteilungen*, 75(1/2, 3/4):29–34, 95–100, **1928.** 3 charts (1 in text, 2 fold. at end of vol.) **DLC**—The climatic characteristics of South America are briefly surveyed with attention to winds, precipitation and temperature. The characteristics of the plant world are listed for the following: forest, savannah, steppe, desert and mountain. The bulk of the work deals with the relation between climate and flora in the Amazon region, Orinoco region, hilly country of Brazil, highland of the Guianas, La Plata system and the foothills of the west. *Subject Headings:* **1. Climatic effects 2. Plant ecology 3. South America.**

**3C–24** 551.515.8(8)

Serra, Adalberto Barranjard and Ratisbonna, Leandro Riedel, **As massas de ar da América do Sul.** [Air masses of South America.] Rio de Janeiro, **1942.** 59 p. numerous charts, diagrs., map, tables. In Portuguese. Available in English and French translations. **DWB**—Classification of air masses of South America, which complements a previous work by A. Serra entitled "The general circulation of South America" published in 1939. [See translation in: *American Meteorological Society, Bulletin*, 22:173–178, 1941.] It [the former work] contains a brief study of the characteristics of the Antarctic mass and of the circulation at definite levels in the southern part of the continent. Numerous graphs and tables are included in this statistical work. *Subject Headings:* **1. Air masses 2. South America. I. Brazil. Serviço do Meteorología.**—*C.Ñ.M.*

**3C–25** 551.585.53

†Sorge, Ernst, **Die Trockengrenze Südamerikas.** [The aridity boundaries of South America.] Berlin, Emil Ebering, **1930.** 64 p. fig., tables, 92 refs. **DWB**—The author gives first his concept of "arid," "humid" and "dry boundaries." The method of determining the demarcation between arid and dry regions through water supply, soil conditions, surface land forms, vegetation, landscape and meteorological observation is discussed. Five aridity zones are recognized in South America: Northeast Brazil, northern South America, the west slope of the Cordillera, the east slope and the easterly foothills of the Cordillera and the inter-Andean foothills. *Subject Headings:* **1. Aridity zones 2. South America.**

**3C–26** 551.582:656.6(8)

*U. S. Hydrographic Office, **Sailing directions for South America.** 4th ed. 1935, 1941, 1938. Washington, D. C., U. S. Gov't Print. Off., **1935–1941.** 3 Vols. figs., fold. charts, tables (in appends.). Spanish-English, Spanish-Portuguese equivalents. H.O. Publication No. 172, 173, 174. **DWB, DLC**—The volumes cover the following areas: Vol. 1 (East Coast) from the Orinoco River to and including the Río de la Plata, Vol. 2 (Southern Part) from the Río de la Plata on the East Coast to Golfo Corcovado on the West Coast including the islands north of latitude 60°10′ south, and Vol. 3 (West Coast) Golfo Corcovado to the Gulf of Panama including off-lying islands. Chap. I of each volume contains a section entitled "Winds and weather." Here will be found fairly detailed descriptions of pressure, winds, gales, pamperos, temperature, rainfall, relative humidity, cloudiness,

fog or haze, thunderstorms, abnormal visibility, atmospheric refraction and mirage, ice and lightning. Appendix III of each volume contains tables of meteorological data from a number of stations. The tables in Vol. II are the most complete and contain monthly averages of mean, maximum, minimum and extreme air temperatures; relative humidity; rainfall; wind (percentage of observation from 8 directions); number of days with gales, fog and thunderstorms, and cloud amount (scale 0–10). Geographic coordinates, altitude, period of record and source of data are also given. In addition, three tables are given for ocean areas with observation of wind velocity and direction, days with haze, mist, fog, drizzle, rain, showers, thunderstorms, heavy squalls, gales and exceptional visibility, and mean cloud amount (scale 0–10). *Subject Headings:* **1. Marine climatology 2. Pilot guides 3. Climatic data 4. South America**

**3C–27** 551.577(8)

*†Voss, Ernst Ludwig, **Die Niederschlagsverhältnisse von Südamerika.** [Precipitation conditions of South America.] *Petermanns Geografische Mitteilungen, Ergänzungsband,* 33, No. 157, **1907.** 59 p. fold. charts, tables, refs. p. 53–59. **DWB**—The discussion covers the following topics: rain zones in South America; seasonal distribution of rain; rain regions (distinguishes 5) and the yearly course of rainfall; rainy and dry periods; rain probability; monthly average, maximum and minimum rainfall amount; monthly and yearly dryness and wetness and rainfall maximum in 24 hours. Approximately 375 stations are listed in alphabetical order with their coordinates, altitude and period of record. Tables present: 1) monthly and seasonal rainfall amounts (unreduced) for stations arranged according to geographic divisions, 2) seasonal rain totals for approximately 160 stations in Argentina (according to CHAVANNE), 3) regions and yearly variations of rainfall, 4) average length of periods with and without rainfall, 5) monthly, seasonal and annual rain probability, 6) mean, maximum and minimum monthly amount of rain and 7) maximum rainfall in 24 hours (monthly and annually). Except for the one instance mentioned, the data are for stations throughout South America. However, the number of stations used is not always the same for each category. The bibliography contains items of a general nature as well as for each country except Paraguay. *Subject Headings:* **1. Precipitation 2. South America.**

**3C–28** 551.524.3(8,728)

*Zych, Stanisław and Czerniewicz, Mieczysław, **Wahania temperatury w Ameryce Południowej w latach 1910–1919.** [Variations in temperature in South America during the years 1910–1919.] *Kosmos,* Lvóv, 55(3,4):533–605, **1930.** 31 figs., tables, refs. In Polish, French summary p. 556–557. **NNA, DLC.** Also in: *Lvóv. Universytet, Instytut Geofizyki i Meteorologii, Komunikaty . . .* , 5(6):533–605, **1930. DLC**—An analysis of temperature variations with data presented in tables and graphs. A map shows the location of the 48 stations in South and Central America and in the Caribbean Sea which were considered. *Subject Headings:* **1. Temperature variations 2. South America 3. Central America.**

## II. SOUTH AMERICA (REGIONAL)

**3C–29** 551.582:656.6(8)

Argentina. Oficio Hidrográfico, **Clima de la zona del Río de laPlata. (Agregado al aviso a los navegantes, No. 75,943.)** [Climate of the Rio de la Plata region. (Supplement to the guide for navigators, No. 75/943.)] Buenos Aires [**1943**]. 19 p. Unchecked.—*Subject Headings:* **1. Marine climatology 2. Pilot guides 3. Río de la Plata Region.**

**3C–30** 551.582.1(8)

Azara, Félix de, **Voyages dans l'Amérique méridionale depuis 1771 jusqu'en 1801 . . .** [Journeys in southern America from 1771 to 1801 . . .] Paris, Dentu, **1809.** 4 Vols. tables. **DLC**—In Vol. I, Chap. I (p. 31–39) the author describes the climate of the Río de la Plata area with reference to temperature, humidity, cloudiness, hail, rainfall, wind, etc. Two editions (1896, 1943) of this work have appeared in Spanish. *Subject Headings:* **1. Climatology 2. Río de la Plata Region.**

**3C–31** 551.582(8)

Bollo, Luis Cincinato. **Climatología platense.** [Climatology of the Río de la Plata area.] Montevideo, Barreiro, **1916.** 32 p. figs., charts. **DWB**—Surveys the climate of five zones in Argentina and discusses briefly the atmospheric pressure, temperature, winds, cloudiness and humidity of the country as a whole. Distribution of rainfall in Argentina, Asunción and Montevideo is mentioned. Description of Uruguay's climate with reference to that of Montevideo during the day and at night for different seasons is given. Included is a weather map for Jan. 31, 1916, isothermal and isobaric charts for Argentina and wind roses for Montevideo. *Subject Headings:* **1. Climatology 2. Río de la Plata Region.**

3C–32 551.557:551.524.7:629.13

Coyle, J. R., **The nature of sub-stratospheric conditions on the Buenos Aires–London air route.** Rio de Janeiro [n.d.]. 10 p. 10 figs., 10 refs. **DWB**—A presentation of the average seasonal conditions of wind and temperature which are believed to prevail along the Buenos Aires–London air route in the summer and winter seasons are illustrated by four cross sections. The author emphasizes the fact that these present a "normal" atmosphere and that day to day variations, sometimes minor and sometimes considerable, do occur. Some of the factors which might cause a distortion of the "normal" situation are then surveyed. The forecasting problem is not considered. *Subject Headings:* **1. Upper air winds 2. Upper air temperatures 3. Aeronautical climatology 4. Buenos Aires–London air route. I. Panair do Brasil. Meteorological Service.**

3C–33 551.509.311:551.515:629.13(8)

§Coyle, J. R., **A practical analysis of weather along the east coast of South America.** Rio de Janeiro, **1940.** 49 p. 36 figs., charts. Mimeographed. **DWB**—A general discussion of synoptic conditions in the Southern Hemisphere, with particular reference to the countries of Brazil, Uruguay and Argentina. Then follows a specific discussion of air masses, storms, fronts and fog conditions affecting airports in this area based on a study of synoptic conditions in 1938. Several methods of analyzing charts in summer and winter are outlined. Finally, a detailed analysis of an actual series of charts (for March 21–29, 1940) is given. *Subject Headings:* **1. Synoptic analysis 2. Synoptic studies 3. Aeronautical climatology 4. South America. I. Panair do Brasil. Meteorological Service.**—*M.R.*

3C–34 551.582:656.6(8)

France. Service Hydrographique de la Marine, **Amérique du Sud, Côte Est.** [South America, East Coast.] Its *Instructions Nautiques*, Ser. H(IV), No. 438, **1951.** 415 p. charts, 2 fold. maps, tables, appends. (1 of French-Spanish equivalents). **DHO**—A section of the introduction (p. 2–27) is entitled "Météorologie" and deals first with temperature, pressure, air masses, wind, relative humidity, precipitation, cloudiness, visibility (fog) and perturbations (pamperos and suestados) of the east coast in a general way. This is followed by a survey of the weather for different regions along the coast. Meteorological data for 8 stations and mean isobaric charts for Jan. and July are included. Coordinates for the stations and source of data are given, but not the period of record. *Subject Headings:* **1. Marine climatology 2. Pilot guides 3. Climatic data 4. South America (east coast).**

3C–35 551.506.1:656.6(82,899)

Germany. Oberkommando der Kriegsmarine, **Monatskarten für den südatlantischen Ozean.** [Monthly charts for the South Atlantic Ocean.] Hamburg, **1944.** 52 p. chiefly charts, some tables. **DWB**—Monthly charts for the portion of the Atlantic between 10°N and 58°S, compiled by the Deutsche Seewarte in 1942–1943 from British, Dutch, and German ship reports gathered over substantial periods for the different elements, which include wind roses for 5° squares, limits of drifting ice, limits of sand and dust, fog frequencies, ocean currents, sea surface temperatures and salinity and density, air pressure and prevailing wind direction, wind speed, storm frequencies and frequencies of light winds. Selected synoptic situations are shown. Quarterly precipitation and fog frequencies are also given. On the final page appears a graph of the diurnal variation of pressure at different latitudes. The coasts of Argentina and Uruguay are covered in fair detail. *Subject Headings:* **1. Marine climatology 2. Climatic data 3. Argentina 4. Uruguay.** *R.S.Q.*

3C–36 551.582:656.6(82,89,899)

*Great Britain. Hydrographic Office, **South American Pilot. Part I. Comprising the north-eastern and eastern coasts of South America from Cabo Orange to Cabo Virgenes, including the Falkland Islands.** 9th ed., 1945. London, **1945.** 623 p. figs., maps, tables, refs. **DLC**—In Chap. I, "Meteorology" (p. 32–55), a discussion of general conditions of this area includes the following: pressure, cyclonic disturbances, winds, gales, land and sea breezes, sea temperature, fog and visibility. Local weather is described in greater detail for various sections along the coast with mention of winds (including a description of the pampero sucio), air temperature and humidity, cloudiness, rain, fog and visibility, lightning and mirage or refraction. Data shown in tables (p. 62–67) for Montevideo, Buenos Aires, Paraná, Asunción, Bahía Blanca and Stanley Harbour. Periods of record vary. *Subject Headings:* **1. Marine climatology 2. Pilot guides 3. Climatic data 4. Argentina 5. Paraguay 6. Uruguay.**

3C–37 551.555.3

Hoefer, A., **Im Pampero-Sturm; eine Strandung vor der La Plata Mündung.** [In the pampero storm; a shipwreck off the mouth of the Rio de la Plata.] *Meereskunde*, Berlin, 14(7), **1925.** 32 p. 13 figs., table. **DLC**—A qualitative description of the "pampero," including wind intensities, cloud

conditions and behavior of the seas is given and the effect of the pampero upon a ship is described in detail. *Subject Headings:* **1. Pamperos 2. Río de la Plata Region.**—*I.L.D.*

**3C–38** 551.582 630(8)

Kaerger, Karl, **Landwirtschaft und Kolonisation im spanischen Amerika.** [Agriculture and colonization in Spanish America.] Leipzig, Duncker & Humblot, **1901.** 2 Vols. fold. diagr., tables. **DLC**—Although Vol. 1, "Die La Plata Staaten" [The La Plata states], deals chiefly with the agricultural production of Uruguay, Paraguay and Argentina, descriptions of climate will be found throughout the volume as follows: Uruguay (p. 221–223), Paraguay (315–317), various parts of Argentina (p. 1–8, p. 415–418, p. 438–443, p. 751–753) and a summary of climatic conditions (p. 850–878). Temperature and rainfall are the elements treated most thoroughly. There are some data—usually annual averages. *Subject Headings:* **1. Climatology 2. Agriculture 3. Río de la Plata Region.**

**3C–39** 551.582(82, 89)

Kanter, Helmuth, **Der Gran Chaco und seine Randgebiete.** [The Gran Chaco and its bordering regions.] Hamburg, Friederichsen, De Gruyter, **1936.** 376 p. figs., charts, photos, tables. **DLC**—The climate of the Gran Chaco, which has few meteorological stations, is described (p. 226–258) in detail from several points of view. The author describes the conditions observed during his various journeys across this area and presents simple synoptic charts, based on the Argentine daily weather maps, for several representative periods in winter and summer. The original observational data accumulated on these journeys are not included but summaries and charts of rainfall, cloudiness, humidity, temperature, air pressure, wind and other elements are given. These are based on data from a number of stations for 1919–1927. Dew, hail, fog and thunderstorm frequency are also mentioned. Not only monthly means, but also variations of the elements from year to year are shown by the tables. A review of this book appears in the *Geographical Journal*, London, 88:80–81, July 1936. *Subject Headings:* **1. Climatology 2. Gran Chaco 3. Argentina 4. Paraguay.**—*M.R.*

**3C–40** 551.582:629.13(8)

*Lamoureux, C. E., Hafstad, Katherine C., and McDonough, Elvin, **Air route weather summary. North and east coast of South America.** *U. S. Weather Bureau, Special Report* No. 255, **1943.** 50 p. numerous tables. Typewritten. Also issued as *U. S. Air Weather Service, Report* No. 420. **DWB**—Describes weather conditions along the route from Albrook Field in the Canal Zone to Buenos Aires mentioning such factors as rain, fog, haze, strong winds, clouds, prevailing winds, features of winds aloft, rainfall regimes, radiation, fog, air masses and fronts, visibility, etc. Conditions at the various fields are surveyed with those in the Canal Zone and on Trinidad Island being given more consideration because there the most unfavorable conditions along the route are encountered. Tables present maximum, minimum and mean temperature; precipitation; relative humidity; cloudiness; number of days with snow, thunderstorms, fog, gales, visibility (one mile, ceiling 1000 ft.), wind direction and velocity for 38 stations along the route. Geographic coordinates, altitude and period of record are given for each station. *Subject Headings:* **1. Aeronautical climatology 2. Climatic data 3. South America (east coast). I. U. S. Air Weather Service II. U. S. Weather Bureau.**

**3C–41** 551.582(8)

*Reed, Wesley Wharton, **Climatological data for southern South America.** *Monthly Weather Review, Supplement* No. 32, **1929.** 23 p. 35 tables, refs. **DLC, DWB**—The area has a varied topography and a wide range in latitude (17°S to 55°S). Consequently, it presents marked contrasts in the values of meteorological elements. These are pointed out in a general discussion of temperature, precipitation and winds. Then follows a survey of climatic conditions in the several divisions. Tables present monthly and annual summaries not only of temperature, precipitation and wind but also of relative humidity, cloudiness, fog and thunderstorms for a number of stations in each country. Number of stations at which observations were made and length of record varies for each element. Included are a station location map and a table giving the altitude of some of the stations. *Subject Headings:* **1. Climatology 2. Climatic data 3. Southern South America.**

**3C–42** 551.5:06

Rotch, A. Lawrence, **The meteorological services of South America. II.** *American Meteorological Journal*, 11(6):201–211, Oct. **1894.** **DLC**—Includes history, organization and publications of the Argentine meteorological office which was established at Córdoba, Argentina, in 1872 in connection with the National Observatory, description of work carried on at the observatory at La Plata, Argentina and the meteorological observatory at Villa Colón, Uruguay and brief reference to

the founding of the Sociedad Meteorológica Uruguaya in 1890. *Subject Headings:* **1. Meteorological services 2. Argentina 3. Uruguay.**

**3C–43** 551.510.42:551.21

Schiller, Walter, **Lluvia de ceniza volcánica en el litoral del Río de la Plata. Caída el 11/12 de abril de 1932.** [Shower of volcanic ash on the shore of the Río de la Plata. Fell April 12, 1932.] *La Plata, Argentina. Universidad Nacional, Museo, Notas Preliminares*, 3:89–94, **1934.** 3 plates, refs. **DLC**—Traces the dispersal of volcanic ash following the eruption of a volcano in Chile on March 2, 1932. The ash gradually spread northward affecting Argentina, Uruguay, Paraguay and even parts of Brazil. The duration of the fall of ash and its depth is noted for several places. In some places it resembled a snowfall. The suspension of particles in the air gave the effect of twilight. *Subject Headings:* **1. Atmospheric pollution 2. Volcanic dust 3. Río de la Plata Region.**

**3C–44** 551.553.8

Vieira, Sebastián E., **Temporales en el Río de la Plata.** [Gales in the Río de la Plata (region).] *Revista Meteorológica*, Montevideo, 8(30):344–354, July **1949.** 4 figs., 2 tables, 4 refs. **DWB**—A study of gales from 10 years' (1936–1945) observations at the Antepuerto station at Montevideo. Included are two tables of wind direction and force, two typical synoptic charts and upper air Baillie wind roses. *Subject Headings:* **1. Gales 2. Río de la Plata Region.**

**3C–45** 551.509(261, 81)

Vuorela, Lauri A., **Synoptic aspects of tropical regions of the Atlantic Ocean, West Africa and South America.** *Helsinki, University, Meteorologian laitos, Mitteilungen*, No. 67, **1950.** 130 p. 47 figs., 46 charts, 14 tables, 32 refs., 10 append. **DWB**—A thorough synoptic aerological study of conditions over the Atlantic, especially the tropical part, during a voyage from northwest Europe to Buenos Aires and back in the fall of 1939. The expedition was led by VÄISÄLÄ and was supported by many institutions. Besides other surface and aerological observations, 112 radiosondes (Finnish) were released and evaluated. Many excellent charts, cross sections and illustrative diagrams are included. Conclusions regarding disturbances in easterlies and flow patterns over the tropical Atlantic, as well as synoptic conditions over South America, are given. (*Same abstract* as No. 2.4–27 in April 1951 *Meteorological Abstracts*.) *Subject Headings:* **1. Tropical meteorology 2. Synoptic analysis 3. Atlantic Ocean 4. West Africa 5. South America.**—*M.R.*

## III. PARAGUAY

**3C–46** 551.582:616(89)

*Bertoni, Guillermo Tell, **Geografía econômica nacional del Paraguay.** [National economic geography of Paraguay.] *Sociedad Científica del Paraguay, Biblioteca* No. 7, **1940.** 235 p. tables, refs. **DA, DLC**—Climate as a factor in the physical environment of Paraguay is surveyed in Chap. 14 (p. 140–157). The following meteorological elements are discussed: solar radiation, soil emanation, temperature, pressure, rainfall, humidity and wind. Tables of temperature and pressure normals for Asunción for 1893–1920 are presented. The chapter also considers the climatological character and position of Paraguay in relation to continental climates, the seasons and geographic nosography. Information on the hydrology and hydrography of Paraguay is contained in Chap. 11 and 12, respectively, of the same volume. *Subject Headings:* **1. Climatology 2. Climatic data. 3. Nosography 4. Asunción, Paraguay 5. Paraguay.**

**3C–47** 551.582:63(89)

Bertoni, Moisés Santiago, **Agenda & mentor agrícola; guía del agricultor & colono con el calendario de todos los trabajos rurales. 3. ed. encargada por el Congreso Nacional (Ley del 31 de octubre 1924).** [Agricultural almanac; guide for farmers and settlers with a calendar of all the rural activities. Commissioned by the National Congress (Law of Oct. 31, 1924).] Puerto Bertoni, Imprenta y Edición "Ex Sylvis," **1926.** 448 p. tables. **DA**—Pt. II, "El clima" (p. 281–345), covers these topics: General characteristics of climate; Modifications of climate; Climatic analogs; Rainfall and periodic phenomena according to months; Temperature—distribution, total and variations; Resistance of plants to extremes of temperature; Resistance of plants to changes of temperature; Influence of the moon, sun and weather changes on vegetation. Schematic tables of rainfall and temperature and a list of 87 plants with critical temperature of resistance and growth are included. *Subject Headings:* **1. Agricultural climatology 2. Temperature effects 3. Plant resistance 4. Paraguay.**

**3C–48** 551.582(89)

*Bertoni, Moisés Santiago, **Agenda y almanaque agrícola Paraguayo. Año 2 y 3.** [Agricultural guide and almanac of Paraguay. Year 2 and 3.] Asunción, Talleres Nacionales de H. Kraus, **1903.**

360 p. figs., tables. **DA**—Sec. 1 of Pt. II deals with the climate of Paraguay—including a resumé of rainfall by month from July 1884 to June 1904—covering such topics as number of rainy days, periodicities, duration of rainfall periods, periods without rain, drought, rainfall sufficiency, intensity and distribution. Hail occurs most frequently in October. Tables give average annual rainfall for 17 stations since 1876 and monthly averages for the east, west and country as a whole. Presents temperature conditions along lines of latitude and longitude. Analogs between Paraguay and other countries are brought out. *Subject Headings:* **1. Climatology 2. Precipitation 3. Paraguay.**

**3C–49** 551.506.3:551.577.31(89)

*Bertoni, Moisés Santiago, **Estudio de las periodicidades diarias aparentes o reales de las lluvias y tempestades.** [Study of daily periodicities, apparent or real, of rainfall and storms.] Puerto Bertoni, Imprenta "Ex Sylvis," **1918.** 58 p. numerous tables. **DLC, DWB**—Attempt to show periodicities in daily rainfall based on rainfall records from 1884–1917 for south Paraguay. Makes a forecast for 1917 which, with a tolerance of ± one day, gives an apparent corroboration of the existence of hypothetical periodicities. *Subject Headings:* **1. Precipitation 2. Periodicities 3. Long period records 4. Paraguay.**

**3C–50** 551.524:63

Bertoni, Moisés Santiago, **Límites de resistencia de las plantas tropicales y subtropicales a las bajas temperaturas.** [Limits of resistance of tropical and subtropical plants to low temperatures.] *Anales Científicos Paraguayos,* 2(5):324–344, July **1919. DLC**—The author contends that it is a great mistake to believe that tropical plants cannot withstand near-freezing. He believes that when there is a discrepancy between biothermal data and the state of the plant, in the majority of cases either the instrument was bad or the observation faulty. A table lists approximately 250 cultivated plants indigenous to the upper Paraná and shows the effects of minimum temperature. *Subject Headings:* **1. Temperature effects 2. Plant resistance 3. Agricultural meteorology 4. Paraguay.**

**3C–51** 551.577.2(89)

Bertoni, Moisés Santiago, **Primeras normales pluviométricas del Paraguay.** [First rainfall normals of Paraguay.] *Revista de Agronomía y Ciencias Aplicadas; Boletín de la Escuela de Agricultura de la Asunción del Paraguay,* 3(1/2):26–32, Oct. **1902.** tables. **DA**—The discussion is illustrated with tables showing total rainfall (in mm.) for Asunción and eight other stations for several years. Each of the latter stations is compared with Asunción and the difference shown. The coordinates for each station except Asunción are given. *Subject Headings:* **1. Precipitation normals 2. Paraguay.**

**3C–52** 551.582(89)

Bourgade La Dardye, Emmanuel de, **Paraguay: The land and the people, natural wealth and commerical capabilities.** English ed. by E. G. Ravenstein (*ed.*), London, George Philip and Son, **1892.** 243 p. fold. map, photos, table. **DLC**—Brief description of climate with reference to temperature and rainfall (p. 71–73). *Subject Headings:* **1. Climatology 2. Paraguay. I. Ravenstein, E. G.** (*ed.*).

**3C–53** 551.582(89)

*Bürger, Otto, **Paraguay, der "Garten Südamerikas"; ein Wegweiser für Handel, Industrie und Einwanderung.** [Paraguay, the South American garden. A guide for trade, industry and immigration.] Leipzig, Dieterich, **1927.** 280 p. graphs, map, tables. **DLC**—A brief description of the climate of Paraguay (p. 8–14) containing data on annual precipitation for the period 1877–1923, mean seasonal precipitation, wind direction and annual and seasonal temperatures for eastern Paraguay and temperature data for the Paraguayan Chaco. Precipitation and temperature data are shown graphically. *Subject Headings:* **1. Climatology 2. Long period records 3. Paraguayan Chaco 4. Paraguay.**—*I.L.D.*

**3C–54** 551.506(89)

*Campbell, Daniel, **Observaciones meteorológicas de Asunción.** [Meteorological observations at Asunción.] *Sociedad Científica del Paraguay, Revista,* 1(3):42–43, May **1922.** all tables. **DLC**—Daily observations of maximum and minimum temperature, pressure and rainfall at Asunción for January, February and March 1922 are presented in tables. Some of the later issues of this periodical carry observations of the above and other elements such as wind direction, cloudiness and relative humidity. The data for 1935 and 1936 (Vol. 4, No. 1) are shown in comprehensive graphs. *Subject Headings:* **1. Observational data 2. Paraguay.**

3C–55 551.582(89)

Chaves, Manuel Wenceslao, **El Paraguay ilustrado.** [Paraguay illustrated.] [Asunción? **1920.**] 280 p. numerous photos. **DLC**—Section on climate (p. 6–9) refers to rainfall, temperature and wind. Mentions the infrequency of hail and hurricanes and the fact that the nights are relatively calm. *Subject Headings:* **1. Climatology 2. Paraguay.**

3C–56 551.582(89)

*Clayton, Henry Helm and Clayton, Frances L., **World weather records, 1931–1940.** *Smithsonian Miscellaneous Collections*, Vol. 105, **1947.** 646 p. chiefly tables. **DWB**—A note on p. 57 states that the meteorological service in Paraguay did not function officially until 1933. Tables on p. 469 and 470 give monthly, monthly average and annual average data for temperature and pressure for 1933–1940 and precipitation for 1931–1940 for Asunción and incomplete precipitation record for Villa Rica, 1931–1940. This volume is a continuation of Vol. 79 and 90 in this series. (*See item* **3C–7** above.) *Subject Headings:* **1. Climatic data 2. World weather records 3. Asunción, Paraguay 4. Villa Rica, Paraguay.**

3C–57 551.582(89)

**Climate of Paraguay.** *American Meteorological Journal*, 8(9):427–428, Jan. **1892.** table. **DWB**—Brief descriptive account with references to temperature, rainy days and frosts. Compares Asunción and Lima as to mean annual temperature and Asunción and Key West, Florida as to precipitation and temperature. Based on data collected by MANGELS, German consul at Asunción for a number of years. *Subject Headings:* **1. Climatology 2. Paraguay.**

3C–58 551.582(89)

Decoud, Héctor Francisco, **Geografía de la República del Paraguay.** [Geography of the Republic of Paraguay.] 6th ed. Leipzig, F. A. Brockhaus, **1911.** 131 p. figs., fold. map, photos, table. **DLC**—The usual meteorological elements are referred to in the discussion of Paraguay's climate (p. 31–35). *Subject Headings:* **1. Climatology 2. Paraguay.**

3C–59 551.582(89)

Decoud, José Segundo, **Paraguay.** 2nd ed. rev. and enl. Washington, D. C. Govt. Print. Off., **1902.** 187 p. fold map., photos, tables, biblio. p. 141–144, append. **DLC, DWB**—Chap. III (p. 17–21) contains quotations from MANGELS, HILL, VAN BRUYSSEL and BOURGADE LA DARDYE attesting to the agreeableness of the climate of Paraguay. Included is one table showing the difference in temperature between the coldest and hottest months of 1886 and another giving the monthly and annual rainfall for the years 1877 through 1891 (except 1884 and 1887). *Subject Headings:* **1. Climatology 2. Temperature data 3. Precipitation data 4. Paraguay. I. International Bureau of the American Republics.**

3C–60 551.506.3:551.577(89)

*Fariña Sánchez, Teófilo, **Investigación estadístíca de las precipitaciones pluviométricas en Asunción del Paraguay.** [Statistical investigation of the rainfall in Asunción, Paraguay.] *Revista Meteorológica*, Montevideo, 5(18):78–88, April **1946.** 2 diagrs., 3 tables. **DWB**—This study presents monthly precipitation values, annual precipitation values and total precipitation for 64 years (1881–1944), illustrated by diagrams and tables. Diagram 1 shows annual average normal, annual rainfall above and below normal, and moving 10 year averages. Diagram 2 shows monthly average normal and rainfall above and below. Table I presents monthly and annual total and average rainfall, Table II gives moving 10 year averages and Table III annual deviation from normal. *Subject Headings:* **1. Precipitation data 2. Long period records 3. Asunción, Paraguay.**

3C–61 551.582.1(89)

Klassen, Wilhelm, **Klimatographische Witterungsschilderung. Nr. 43: Paraguay. Witterungsverlauf an einem Januartage in Schönbrunn. Beobachtungstag: 15. Januar 1935.** [Climatographical weather description No. 43: Paraguay. Weather sequence on a January day in Schönbrunn. Day of observation: January 15, 1935.] *Annalen der Hydrographie und Maritimen Meteorologie*, 63(8):321–322, Aug. **1935. DLC**—Hourly climatological description of the weather at Schönbrunn, a small settlement in the Chaco region. The elements mentioned are temperature, wind and cloudiness. Coordinates and altitude are given. Taken from a report of the Deutsche Seewarte. *Subject Headings:* **1. Climatology 2. Schönbrunn, Paraguay.**

3C–62 551.582(81,89)

Knoche, Walter, **Klimatologisches aus Brasilien und Paraguay.** [Notes on the climate of Brazil and Paraguay.] *Meteorologische Zeitschrift*, 45(1):32, Jan. **1928. DWB**—Impressions gained by the author on a 500 km trip from São Paulo through Matto Grosso and on to north Paraguay. The vegetation on either side of the Paraná showed marked differences—that in the state of

São Paulo reflected a wet climate while that in the state of Matto Grosso a dry one. Meteorological data, unfortunately, was meager. In Matto Grosso, and even in north Paraguay and the Chaco, electrical discharges are observed in the spring under a clear sky. However, temperatures in the shade might be 38° to 40°C. He describes filaments of smoke which result from grass fires and stretch across the river like fog. At the same time, the sky becomes a pale blue and then whitish. Haze stratus and stratocumulus clouds, which are characteristic of the area and strongly influence radiation, are different from the stratus and stratocumulus formed over fires. During these fires, the weather is very sultry, even at night. On a part of the trip he saw evidence of drought—it had not rained for seven months. On one side of the river the grass was dried up right to its edge but on the other (the Paraguayan) where the stream overflowed, everything was green. *Subject Headings:* **1. Climatology 2. Clouds 3. Plant ecology 4. Brazil 5. Paraguay.**

**3C–63** 551.582(8)

*Mangels, H., **Paraguay. Wirtschaftliche, naturgeschichtliche und klimatologische Abhandlungen.** [Paraguay. Treatise on economy, natural history and climatology.] 2nd ed. München-Freising, Dr. F. P. Dattera & Cie., **1919.** 255 p. plates, tables. **DWB**—Pt. 15, "Das Klima Paraguays" [Paraguayan climate] (p. 90–114), contains description of temperature, barometric pressure and wind, and daily observations for April 1880, Oct. 1880 and November 1889 of minimum, maximum and average temperatures, humidity, pressure, rainfall, wind and cloudiness (elements observed vary for different months). Pt. 16, "Regenstudien" [Rainfall studies] (p. 115–123), is a discussion, with table, of monthly and annual rainfall at Asunción from 1884–1902 (except 1884, 1887 and 1890). *Subject Headings:* **1. Climatology 2. Rainfall 3. Climatic data 4. Paraguay.**

**3C–64** 551.582(89)

*Mangels, H., **Wirtschaftliche, naturgeschichtliche und klimatologische Abhandlungen aus Paraguay.** [Treatise on economy, natural history and climatology of Paraguay.] München, Dr. F. P. Dattera & Cie., **1904.** 364 p. plates, tables. **DWB**—Pt. 15 (p. 102–140), "Das Klima Paraguays" [Paraguayan climate], contains descriptive and tabular material on the climate of Paraguay. Discussion of temperature, barometric depression and winds. Tables include monthly and annual frequencies of winds from different directions for 1886; fragmentary daily, monthly and annual temperature; barometric pressure; humidity; wind; rainfall and cloudiness; monthly and annual rainfall for Asunción for period from 1877–1902 (except 1884, 1887 and 1890) with summary of 23 years of rainfall record, total annual rainfall for several years for 5 stations. Article contains some historical material. *Subject Headings:* **1. Climatology 2. Climatic data 3. Paraguay.**

**3C–65** 551.582:616(89)

Migone, Luis E., **Apuntes de climatología y nosografía médica del Paraguay.** [Brief survey of climatology and medical nosography of Paraguay.] *Sociedad Científica del Paraguay, Revista,* 2(5):203–222, May **1929. DLC**—The first part of this work surveys the geology, geography, hydrography, hydrology, ethnography and climate of Paraguay. This is followed by a description of the climate and comment as to the healthfulness of each of seven regions of the country. The last part discusses a number of diseases found in Paraguay, the areas in which they are most prevalent and measures being taken to combat them. *Subject Headings:* **1. Climatology 2. Nosography 3. Paraguay.**

**3C–66** 551.506(89)

***Observaciones climatológicas.** [Climatic observations.] *"Asunción," Revista Mensual Ilustrada,* 1(2):31, March **1930. DPU**—A table giving daily observations of mean, maximum and minimum temperature and vapor pressure, humidity, cloudiness, wind and evaporation for Feb. 1930 for Asunción. *Subject Headings:* **1. Observational data 2. Asunción, Paraguay.**

**3C–67** 551.582.2(89)

***Observaciones en Asunción (Paraguay).** [Observations in Asunción (Paraguay).] *Argentina, Oficina Meteorológica, Anales,* 12:37–260, **1898.** chiefly tables. **DWB**—Tables giving daily and monthly barometric pressure, temperature, relative humidity, cloudiness and wind direction and force for 1892–1896. Juan D. Anisits was the observer. *Subject Headings:* **1. Climatic data 2. Observational data 3. Asunción, Paraguay. I. Anisits, Juan D.**

**3C–68** 551.582(89)

**Observaciones meteorológicas. Datos de la Dirección de Meteorología.** [Meteorological observations. Data from the Dirección de Meteorología.] *Asunción, Centro de Estudiantes de Ciencias Económicas, Revista,* 3(21):710–711, 713, June **1941. Lluvia caída (en milímetros) durante el mes de mayo de 1941. Datos de la Dirección de Meteorología.** [Rainfall amount (in millimeters) during the month of May 1941. Data from the Dirección de Meteorología.] *Ibid.,* 3(21):714, June

**1941.** table. **DPU**—The first article summarizes briefly the pressure, temperature, evaporation, relative humidity, wind and precipitation for Asunción, Bahía Negra and Pilar for May 1941. The coordinates and altitude for each station are given. The second article presents a table with data for 47 stations. *Subject Headings:* **1. Climatology 2. Fragmentary climatic data 3. Paraguay.**

**3C–69** 551.582(89)

*Paraguay. Dirección General de Estadística, **Anuario estadístico de la República . . . 1886–1942.** [Statistical annual of the Republic of Paraguay . . . 1886–1942.] Asunción, **1888–1944.** 7 Vols. all tables. Title varies slightly. **DLC**—This annual suspended publication from 1888–1913 and 1918–1939, inclusive. Pt. II (p. 11–20) of the 1946–1947 volume presents tables for the following: 1) absolute minimum, maximum and average temperature, relative humidity and rainfall for 8 stations in 1946 and 1947; 2) monthly and annual rainfall for 45 stations in the Región Oriental for 1946, for 27 stations for the same area for 1947 and for 14 stations in the Región Occidental (Chaco) for 1946; 3) mean, maximum and minimum atmospheric pressure, cloudiness and wind frequency at Asunción for 1946–1947. *Subject Headings:* **1. Climatic data 2. Paraguay.**

**3C–70** 551.506.1(058)(89)

Paraguay. Dirección General de Estadística, **Memoria . . . correspondiente al año 1929, . . . 1934, . . . 1938.** [Report for the year 1929, . . . 1934, . . . 1938.] Asunción, **1930, 1936, 1948.** 3 Vols. chiefly tables. **DLC**—In these annual reports, tables summarizing the usual meteorological data for one year for Asunción are presented. *Subject Headings:* **1. Climatic data 2. Annual reports 3. Asunción, Paraguay.**

**3C–71** 551.506(89)

Paraguay. Ministerio de Guerra y Marina, **Rainfall and temperature records—Paraguay.** [**1941.**] 17 p. Typescript. **DWB**—Data from 9 stations for monthly temperature and rainfall. Longest record, 1929–1940, is for Asunción. Records incomplete for some stations. Information submitted by the American consul at Asunción. Note states that it was secured at the Weather Bureau, an agency of the Ministry of War and Marine. *Subject Headings:* **1. Rainfall data 2. Temperature data 3. Paraguay.**

**3C–72** 551.582(89)

*Rivas Rodríguez, Serafín, **Contribución al estudio del clima del Paraguay.** [Contribution to the study of the climate of Paraguay.] Asunción, Tipografía de "El Paraguayo," **1890.** 33 p. 9 tables (3 fold.). **DLC**—Climatic characteristics are described. Most of the data is for the period from June 1888 to June 1889 and is for temperature, rainfall, atmospheric pressure, wind, cloudiness, hail and frost. *Subject Headings:* **1. Climatology 2. Paraguay.**

**3C–73** 551.582(89)

*Vallentin, Wilhelm, **Paraguay. Das Land der Guaranis.** [Paraguay. Land of the Guaranis.] Berlin, Hermann Paetel, **1907.** 323 p. photos, tables. **DLC**—The climate is described on p. 18–20 and tables present mean, maximum and minimum temperature for 1892–1898 and precipitation amounts for 1902–1905 at Asunción. *Subject Headings:* **1. Climatology 2. Temperature data 3. Precipitation data 4. Asunción, Paraguay.**

## IV. URUGUAY

**3C–74** 551.582(899)

Bergeiro, José María, **El clima del Uruguay.** [The climate of Uruguay.] *Montevideo. Instituto de Estudios, Boletín de Meteorología,* 3(4):7–28, **1945.** charts, graphs, appends. **DLC**—A general discussion dealing in some detail with the following meteorological elements: rainfall, temperature, hail, wind, cloudiness, insolation and frost. The graphical material includes seasonal isothermal and isohyetal charts (the two elements on one chart), wind roses and a climagram for Montevideo. *Subject Headings:* **1. Climatology 2. Uruguay.**

**3C–75** 551.577 551.524

Bergeiro, José María, **Fisonomía pluvio-térmica normal "equinaria."** ["Five day" normal rainfall and temperature features.] *Revista Meteorológica,* Montevideo, 4(14):118–122, April **1945.** graph, table. **DWB**—Five-day normals of temperature and rainfall, 1901–1940. The data is based on observations at the Estación Prado in Montevideo. *Subject Headings:* **1. Rainfall normals 2. Temperature normals 3. Montevideo, Uruguay.**

**3C–76** 551.578.72(899)

Bergeiro, José María, **Frecuencia e intensidad del granizo en el Uruguay.** [Frequency and intensity of hail in Uruguay.] *Revista Meteorológica,* Montevideo, 4(16):276–286, Oct. **1945.** 5

charts, table. **DWB**—A study covering the decade from 1934 through 1943. The charts show distribution of frequency (annual and October and March) and size of hailstones. Among the conclusions are these: 1) the areas most affected are the west, southwest and the Department of Florida; 2) the area least affected is the northeast; 3) hailstones >25 mm occurred most frequently in Florida and next most frequently in Colonia and 4) the largest hailstone observed in the 10-year period was 68 mm in diameter. *Subject Headings:* **1. Hail distribution 2. Hail size distribution 3. Uruguay.**

**3C–77** 551.582:551.588.1:551.46(899)

Bergeiro, José María, **La influencia marítima en el clima del Uruguay.** [Maritime influence on the climate of Uruguay.] *Revista Meteorológica*, Montevideo, 9(35):151–168, Oct. **1950.** 9 figs. **DWB**—Effects of air masses and air flow from oceanic or continental portions of the Southern Hemisphere on temperature and rainfall of Uruguay compared. Microclimatic conditions during normal and abnormal situations discussed, and climagrams and other schematic charts presented by way of illustration. Usefulness of oceanographic research for forecasting weather and interpreting climate stressed. (*Same abstract* as No. 2.8–131 in Aug. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Climatology 2. Marine influences 3. Oceanographic research 4. Uruguay.**—*M.R.*

**3C–78** 551.586:63(899)

Bergeiro, José María. **La meteorología al servicio de la agricultura. Relaciones bio-climáticas de los principales cultivos.** [Meteorology in the service of agriculture. Bio-climatic relationships of the principal crops.] Montevideo, Imp. García, **1936.** 40 p. 39 figs., photos. **DA**—The author surveys the relation between meteorological elements and the cultivation of wheat, flax, barley, corn and grapes and concludes that the total rainfall in the summer is the most important element to be considered. The data is presented in charts, graphs and tables. He also outlines a plan for a special service of agricultural ecology in Uruguay. Descriptions of two new meteorological instruments (Bergeird barojetograph for measuring rainfall intensity and a thermopluviometer for measuring rain temperature) and a summary of a microclimatic study made in forests are included. *Subject Headings:* **1. Agricultural climatology 2. Uruguay. I. Asociación Rural del Uruguay.**

**3C–79** 551.509.3 551.509.8

Bergeiro, José María. **La previsión del tiempo en agricultura.** [Forecasting weather for agriculture.] *Uruguay. Dirección de Agronomía Publicación Mensual*, 6(3/7):57–80, Mar./July **1933.** 12 figs., refs. **DA**—This work is divided into three parts: probabilities of weather elements for each month of the year according to daily normals, 2) local forecasting of a scientific character and 3) popular forecasting. *Subject Headings:* **1. Weather forecasting 2. Weather lore 3. Uruguay.**

**3C–80** 551.524.33 551.578.13

Bergeiro, José María. **La temperatura y la lluvia estacional en el Uruguay. Delimitación regional climato-geográfica y normales respectivas.** [Seasonal temperature and rainfall in Uruguay. Regional climato-geographic zones and corresponding normals.] *Revista Meteorológica*, Montevideo, 5(20):264–271, Oct. **1946.** 5 charts. **DWB**—A study to determine the zonal norms of the country by an examination of seasonal temperature and rainfall. Five climato-geographic zones are indicated on a chart which also shows location of meteorological and thermo-pluviometric stations. Other charts present seasonal isothermal and isohyetal lines. *Subject Headings:* **1. Seasonal temperature distribution 2. Seasonal rainfall distribution 3. Climatic zones 4. Uruguay.**

**3C–81** 551.524.36:63 551.577.36:63

Bergeiro, José María, **El tiempo probable en el curso de cada mes. Método estadigráfico de "Indices de frecuencia." Ritmo meteorológico normal anual.** [The probable weather in the course of each month. Graphic method of "Indexes of frequency." Normal annual meteorological rhythm.] Montevideo [n.d.] 32 p. graphs. **DWB**—The curves of normal temperature and rainfall frequencies are given for each day of the year as a guide to Uruguayan agriculture. *Subject Headings:* **1. Temperature frequencies 2. Rainfall frequencies 3. Agricultural climatology 4. Uruguay. I. Asociación Rural del Uruguay.**

**3C–82** 551.555.4

*Christison, David, **On the pamperos of central Uruguay.** *Scottish Meteorological Journal*, 5(60/63):335–347, **1878.** 2 figs., tables. **DLC**—Refers first to definitions by Gould and Burmeister and to observations in Argentina by Gould and De Boer. Defines pamperos as "SW winds of some vehemence, although by no means necessarily of great strength, blowing over a district of unknown limits, in the region vaguely known as that of the River Plate. Other characters give to a certain number of them a strongly marked individuality, but are not necessarily present." The author describes a number of pamperos that he observed at San Jorge (1867–1868) and presents a table giving the data, pressure, temperature, cloudiness, wind direction and force, and observation

of thunder, lightning and rain for six of them. Other tables show wind direction at San Jorge and Buenos Aires in connection with pamperos and ordinary storms observed at San Jorge, and pressure at the same places in connection with pamperos and gales observed at San Jorge. *Subject Headings:* **1. Pamperos 2. Uruguay.**

**3C–83** 551.582(899)

Hann, Julius, **Zum Klima von Uruguay.** [The climate of Uruguay.] *Meteorologische Zeitschrift*, 12(2):150–151, Feb. **1895.** tables. **DLC**—Brief text and tables. The latter are monthly and annual summaries of atmospheric pressure, temperature, humidity, vapor pressure, cloudiness, sunshine, rainfall, thunderstorms and frequency of wind and calm for a 12-year period (1881–1892) at San Jorge and mean temperature and total rainfall for each month for the same period. *Subject Headings:* **1. Climatology 2. San Jorge, Uruguay.**

**3C–84** 551.509.33:551.465

Jagsich, Juan, **Influencia oceánica en nuestro tiempo. Posibilidades del pronóstico del tiempo a largo plazo.** [Oceanic influence on our weather. Possibilities of long range weather forecasting.] *Revista Meteorológica*, Montevideo, 3(12):305–384, Oct. **1944.** 78 figs., 7 maps, 45 refs. **DLC**—See also: *Montevideo, Inst. Nac. Invest. Georg.*, No. 5, **1944. GB-MO**—An introductory study of the possibility of long range forecasting in Uruguay. Chap. 1 describes a periodicity of 3 years in rainfall, influence of solar activity and solar constant, and volcanic eruptions. The 3-year cycle is supposed to originate in the interiors of continents and to be transmitted by variations of ocean currents. Chap. 2 describes the effect of the intensity of the atmospheric circulation on Uruguay weather, again through the 3-year oscillation and ocean currents. Chap. 3 deals with the Brazil Current and prevailing winds, and shows some parallelism between rainfall and temperature of Fernando Noronha and subsequent weather in Uruguay. In Chap. 4 the effect of the Humboldt Current is shown in numerous graphs. Chap. 5 discusses effect of air mass trajectories, Chap. 6 that of the South Orkneys on Uruguay weather. In the final chapter, author recommends the creation of a Spanish-American oceanographical institute to study these results with a view to long range forecasting. (*Same abstract as* No. 2B–188 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Ocean currents 3. Periodicities 4. Uruguay.**—*C.E.P.B.*

**3C–85** 551.582:615.8(899)

*Jaureguy, Miguel A., **Estudio climatológico médico de Punta del Este.** [Medical climatological study of Punta del Este.] *Revista Meteorológica*, Montevideo, 5(17):7–16, Jan. **1946.** tables, refs. **DWB**—Compares the climates of the Lido of Venice and Punta del Este as to monthly cloudiness, relative humidity and temperature (air and water). Concludes that the climate of the coast of Uruguay, especially in the oceanic zone, is excellent for the treatment of tuberculosis and is suitable for heliotherapy in winter and for balneotherapy for five months of the year. *Subject Headings:* **1. Climatotherapy 2. Uruguay.**

**3C–86** 551.593(03)(899)

Lagarmilla, Roberto E., **Sobre la coloración anormal del cielo y de los astros, observada periódicamente en Montevideo.** [On the abnormal color of the sky and stars, observed regularly at Montevideo.] *Revista Meteorológica*, Montevideo, 9(35):130–150, Oct. **1950.** 4 figs., 7 refs. **DWB**—Many optical terms used in meteorology are defined. Differences between meteorological and optical characteristics of polar and tropical air masses are listed in tabular form. The most important optical peculiarities of these masses are then discussed: refraction, absorption, diffusion, abnormal reflection and polarization. Causes of these differences are attributed to solid (dust, salt, pollen, smoke, etc.) and liquid particles, and to density differences. Observational methods and actual observations made at Montevideo in 1948, 1949 and 1950 are discussed at length. (*Same abstract* as No. 2.9–173 in Sept. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Skylight color 2. Optical phenomena 3. Definitions 4. Montevideo, Uruguay.**—*M.R.*

**3C–87** 551.501.9

Lamarthée, Julio F., **El Servicio Meteorológico del Uruguay. Su funcionamiento y proyectos para un futuro próximo.** [Meteorological Service of Uruguay. Its operation and plans for the near future.] *Revista Meteorologica*, Montevideo, 1(1):62–74, Jan. **1942.** chart, 2 tables. **DWB**—The formation of the Servicio Meteorológico del Uruguay may be traced back to 1895. In that year, a meteorological observatory was established to serve as an auxiliary to the Comisión de Estudios del Puerto de Montevideo. In 1900 the Observatorio Municipal del Prado was founded. The work of these two observatories was continued and expanded by the forming in 1905 of the Instituto Nacional Físico Climatológico and the Instituto Nacional para la Previsión del Tiempo, respectively. The work of each of these is outlined. In 1925 they were united to form the Observatorio Nacional whose name was changed in 1934 to Servicio Meteorológico del Uruguay. The

last named was a part of the Ministerio de Defensa Nacional. The organization of the present Service is described. Tables list the stations (with coordinates and altitudes) that supply data to the Service and the stations that make up the rainfall network. A map showing station locations is included. *Subject Headings:* **1. Meteorological services 2. Uruguay.**

**3C–88** 551.506.7(899)

*Montevideo. Observatorio Nacional, **Sondeos de la atmósfera en Montevideo. Año 1927, 1928.** [Upper air soundings in Montevideo. Year 1927, 1928.] Montevideo, **1928, 1929.** paging varies. graphs, chiefly tables. **DPU**—Actual daily (but irregular) pilot balloon soundings and summarized data for various levels up to 7 km for 16 directions for Aug–Dec. 1927 and for 1928 are tabulated. *Subject Headings:* **1. Pilot balloon data 2. Observational data 3. Montevideo, Uruguay.**

**3C–89** 551.582(899)

Montevideo. Universidad. Facultad de Agronomía. Estación Experimental de Riego. Sección Fito-Meteorológica y de Ecología Agrícola, **Consideraciones sobre algunos aspectos de la climatología local.** [Consideration on some aspects of local climatology.] Montevideo, Imp. Augusta, **1937.** 22 p. tables, graph. **DA**—Following a summary of temperature and rainfall conditions from 1922–1936, a meteorological synopsis for the year 1936 which covers temperature, pressure, wind, humidity, precipitation, evaporation, cloudiness and various phenomena is given. *Subject Headings:* **1. Climatology 2. Temperature 3. Rainfall 4. Uruguay.**

**3C–90** 551.578.7:551.509.3

Morandi, Luis, **Actividades meteorológicas en el Uruguay; una investigación metódica de la frecuencia e intensidad del granizo en el Uruguay.** [A methodical investigation of the frequency and intensity of hail in Uruguay.] *Revista Meteorológica,* Montevideo, 3(11):297–298, July **1944. DWB**—Describes project to begin in Jan. 1945 whereby persons untrained in meteorology will take hail observations throughout the country. (*Same abstract* as D–19 in April 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Hail 2. Observation techniques 3. Uruguay.**

**3C–91** 551.553:551.506(899)

*Morandi, Luis, **Calmas relativas y vientos impetuosos en el clima de Montevideo. Nueva contribución a su estudio.** [Relative calm and violent winds in the climate of Montevideo. Second contribution to this study.] *Montevideo. Instituto de Estudios Superiores, Sección de Investigaciones Meteorológicas, Boletín* No. 2, **1940.** 32 p. figs., 8 tables. **DLC**—Part I deals with wind direction—data for period from 1906 to 1923. Annual prevailing winds are E and ESE and for winter are N. Illustrated by wind roses. Pt. II is concerned with gales. Tables present frequency of monthly, seasonal and annual gales by hours and frequency of gales from the 16 directions for 1906–1923. Pt. III discusses hourly frequency of calms or light winds according to six definitions. Data presented in tables and graphs. Pt. IV deals with calms—daily, nightly and seasonal frequency of each type of calm. *Subject Headings:* **1. Wind variations 2. Wind data 3. Montevideo, Uruguay.**

**3C–92** 551.582(899)

*Morandi, Luis, **Características fundamentales del clima del departmento de Montevideo.** [Fundamental characteristics of the climate of the department of Montevideo.] *Revista Meteorológica,* Montevideo, 1(3):38–48, July **1942.** tables. **DWB**—Data from four stations, located within 10 km of each other and in similar environments, totaling 56 years (1883–1938) were used. These elements were studied: air temperature, atmospheric pressure, relative humidity, rainfall frequency, evaporation, force and direction of surface winds, cloudiness, hail frequency and electric storms. Tables usually give annual averages. *Subject Headings:* **1. Climatology 2. Climatic data 3. Uruguay.**

**3C–93** 551.577 551.578.7

Morandi, Luis, **Frecuencia, cantidad y modalidades de la lluvia y del granizo en Villa Colón (Montevideo), en el período 1884–1914.** [Frequency, quantity and nature of rainfall and hail in Villa Colón (Montevideo) in the period 1884–1914.] Washington, D. C., Imprenta del Gobierno, **1917.** 10 p. table, graphs. **DPU**—A description of the meteorological observatory at the Colegio Pío is followed by a summary of the daily, monthly and seasonal march of rainfall; frequency of rainfall; intervals of days without rain; frequency of hail; distribution by seasons and wind direction in each of the 78 cases observed. *Subject Headings:* **1. Rainfall 2. Hail 3. Montevideo, Uruguay.**

**3C–94** 551.506:551.575.31

*Morandi, Luis, **Frecuencia e intensidad horaria de la niebla en tres localidades del Uruguay durante el año 1943–1944.** [Hourly frequency and intensity of fog in three localities of Uruguay

in the year 1943–1944.] *Revista Meteorológica*, Montevideo, 4(14):105–11, April **1945.** graph, tables. **DWB**—Hourly observation of fog was begun in 1942 at the three bases of the air force—Camino Mendoza, Pando and Vi. All data were collected at the first mentioned base at the end of each month. The standards to be followed in making the observations are listed. The data presented here are for the period from July 1943–June 1944. *Subject Headings:* **1. Fog frequencies 2. Fog intensity 3. Observational data 4. Uruguay.**

**3C–95** 551.506:551.553.6(899)

*Morandi, Luis, **Frecuencia y modalidad de las calmas horarias en Montevideo. Período 1906–1914. Conferencia pronunciada en el Instituto Nacional de Agronomía de Montevideo.** [Frequency and nature of hourly calms in Montevideo. Period 1906–1914. Conference held at the National Institute of Agronomy at Montevideo.] Montevideo, Talleres Gráficos del Estado, **1915.** 22 p. tables, fold, graph. **DPU**—Tables give monthly averages of calms and wind movements of <1 km, <2 km, <5 km, <7 km, <12 km and <15 km for each hour of the day and a summary of this investigation. The data are also presented in a graph. *Subject Headings:* **1. Wind frequencies 2. Calms 3. Wind data 4. Montevideo, Uruguay.**

**3C–96** 551.506.3:551.577(899)

*Morandi, Luis, **La frecuencia y intensidad udométrica horaria en Montevideo durante el período 1906–1940.** [Hourly frequency and intensity of rainfall in Montevideo for the period 1906–1940.] *Revista Meteorológica*, Montevideo, 2(7):209–238, July **1943.** 7 figs., tables. **DWB**—Monthly, seasonal and annual data presented in graphs and tables and accompanied by explanatory material. *Subject Headings:* **1. Precipitation frequencies 2. Precipitation intensity 3. Long period records 4. Montevideo, Uruguay.**

**3C–97** 551.578.72(899)

Morandi, Luis, **El granizo en nuestro clima.** [Hail in our climate.] *Revista Meteorológica*, Montevideo, 4(13):60-62, Jan. **1945.** tables. **DWB**—Statistics based on 8 years' observations of hail in the Prado (Montevideo) and 31 years in Villa Colón. Table gives average annual frequency of hail for 12 departments of Uruguay. Details of hail size. (*Same abstract* as No. D–176 in April 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Hail distribution 2. Hail structure 3. Uruguay.**

**3C–98** 551.506.3 551.582(899)

*Morandi, Luis, **Normales para el clima de Montevideo (Período 1883–1938).** [Normals for the climate of Montevideo. (Period 1833-1938).] *Montevideo. Universidad, Facultad de Agronomía, Revista*, No. 20:9-22, April **1940.** tables, graph. **DA**—Analysis and data for temperature, atmospheric pressure, relative humidity, precipitation, evaporation, cloudiness, wind velocity, hail frequency and frequency of days with electrical phenomena. The temperature, rainfall and electrical phenomena records are for 56 years, those for other elements are for shorter periods. *Subject Headings:* **1. Climatic normals 2. Long period records 3. Uruguay.**

**3C–99** 551.506.3:551.553.8(899)

*Morandi, Luis, **Nueva contribución al estudio de los vientos impetuosos (47 ó mas k/h) en el estuario del Plata (Período de 29 años: 1906 a 1924; 1930 a 1939).** [New contribution to the study of strong winds (47 or more km/hr) in the Plata estuary (period of 29 years: 1906 to 1924; 1930 to 1939).] *Instituto Histórico e Geográfica do Rio Grande do Sul. Congresso Sul-Riograndense de Historia e Geográfico, Anais*, Porto Alegre, 3:1497 1513, **1940.** 6 figs., 3 tables, ref. **NNA**—Using 29 years' observations from the Observatorio del Prado, the author discusses the characteristics of gales or high winds in the Montevideo region: annual, monthly and hourly frequencies of gales (with summary tables and graphs) and frequencies of direction with monthly wind roses and a wind rose for the 29-year period. Brief reference is made to attending meteorological conditions. Pressure charts for two occurrences are included. *Subject Headings:* **1. Gales 2. Long period records 3. Montevideo, Uruguay.**—*H.P.K.*

**3C–100** 551.501.9 551.582(899)

*Morandi, Luis, **Ocho años (1929–36) de observaciones meteorológicas en la estación de la aeronáutica militar-Camino Mendoza (Montevideo).** [Eight years of meteorological observations at the military airbase—Camino Mendoza (Montevideo).] Montevideo, Talleres Gráficos Aeronáutica Militar, **1938.** 28 p. graphs, numerous tables. **DWB**—The preface contains a brief history of the meteorological stations of the military airbase (1927–1936), of the Colegio Pío de Villa Colón observatory (1883–1900), of the Prado observatory (1901–1921) and the meteorological station of the Faculty of Agronomy (1922–1928). The main body of the work consists of two parts: 1) an analysis of pressure, temperature, humidity, precipitation, wind, cloudiness, etc. using data

from above mentioned stations; 2) thirty-one tables of monthly averages of the usual elements at the Camino Mendoza airbase for each year of the period 1929–1936 and a summary for the period. *Subject Headings:* **1. Meteorological stations 2. Climatology 3. Montevideo, Uruguay.**

**3C–101** 551.506:551.582(899)

*Morandi, Luis, **Promedios—normales para los principales factores del clima del Dep. de Montevideo sobre la base de observaciones semi-seculares (1883–1938) y frecuencia del viento (16 direcciones) durante del decenio 1929–38 en el aerodromo militar del Camino Mendoza (Montevideo).** [Average normals for the principal climatic factors of the department of Montevideo based on half a century of observation (1883–1938) and wind frequency (16 directions) during the ten year period (1929–1938) at the military airbase of Camino Mendoza (Montevideo).] Montevideo, A. Monteverde & Cía., **1939.** 24 p. graphs, tables. **DLC**—Pt. I. Average normals for temperature, atmospheric pressure, relative humidity, rainfall (quantity and frequency), evaporation, cloudiness, wind speed, hail frequency and electrical disturbances are presented in tables and graphs. Each element is commented on briefly. Pt. II. Observations of surface winds were taken thrice-daily at 7, 14 and 21 hrs. and data summarized for months, season and year. Chart shows result of total observation. Surface wind roses and wind rose data are included. *Subject Headings:* **1. Climatic normals 2. Climatic data 3. Montevideo Department, Uruguay.**

**3C–102** 551.506:551.524 551.577.2(899)

*Morandi, Luis, **Resumen y discusión de las observaciones meteorológicas del Observatorio Central. Período 1901–1915.** [Summary and discussion of the meteorological observations at the Central Observatory. Period 1901–1915.] Montevideo, Francisco Arduino, **1917.** 19 p. tables. **DWB**—Includes absolute extremes of temperature at ten stations and precipitation normals at fifty-two stations in Uruguay. *Subject Headings:* **1. Temperature data 2. Precipitation data 3. Uruguay. I. Instituto Nacional Físico-Climatológico.**

**3C–103** 551.506.1 551.46(899)

*Pérez Fontana, Hispano V., **Estudio de correlación de elementos meteoro-oceanográficos en los puertos de Montevideo y Punta del Este. Año 1938.** [Study of correlation of meteoro-oceanographical elements in the ports of Montevideo and Punta del Este. Year 1938.] *Revista Meteorológica*, Montevideo, 1(2):72–75, April **1942.** 17 tables, 12 plates (in append.). **DWB**—Tables present the following data for the two stations: 1) monthly and annual average air temperature, water temperature, and salinity per thousand and height of the tide; 2) monthly maximum and minimum temperature, density and salinity of the water; 3) daily observations of density of 0°, air and water temperature, salinity, wind direction and force, and height of the tide. The data is also presented graphically. *Subject Headings:* **1. Climatology 2. Climatic data 3. Montevideo, Uruguay 4. Punta del Este, Uruguay.**

**3C–104** 551.577.2(899)

Ribeiro Reissig, Aníbal, **Algunas determinaciones sobre las características de la lluvia en la República en las cuatro estaciones del año.** [Some conclusions on the characteristics of rainfall in the Republic in the four seasons of the year.] *Revista Meteorológica*, Montevideo, 4(16):287–296, Oct. **1945.** charts, graph, table. **DWB**—Monthly, seasonal and annual normal values for 400 stations (summarized for the departments and the country as a whole) are the basis of this study. Autumn has the heaviest rains, winter the next, spring the next and summer the least. The department with the highest and lowest rainfall in each season is given. *Subject Headings:* **1. Seasonal precipitation distribution 2. Uruguay.**

**3C–105** 551.506.3:551.524.3(899)

*Ribeiro Reissig, Aníbal, **Comportamiento de la temperatura al abrigo en el clima del Uruguay y particularmente de Montevideo.** [Temperature variations in a shelter in Uruguay and especially at Montevideo.] *Revista Meteorológica*, Montevideo, 1(2):64–71, April **1942.** table, 2 graphs. **DWB**—Based on data from Montevideo for a 40-year period (1901–1940) and for shorter periods from the interior of the country, a table of monthly and annual temperature normals is presented. The mean and extreme annual temperature regime and year to year variations of the same for 1901–1940 are shown graphically. The monthly march of temperature in a shelter in Montevideo is summarized. *Subject Headings:* **1. Temperature variations 2. Long period records 3. Montevideo, Uruguay 4. Uruguay.**

**3C–106** 551.577.38

*Ribeiro Reissig, Aníbal, **Datos estadísticos relativos a la gran sequía del período septiembre 1942 a abril 1943, procedentes del Servicio Meteorológico del Uruguay.** [Statistical data relative to the extreme drought in the period from Sept. 1942 to April 1943 compiled by the Meteorological

Service of Uruguay.] *Revista Meteorológica*, Montevideo, 2(8):297–307, Oct. **1943.** graph, tables. **DWB**—Study of the drought in Uruguay from Sept. 1942–April 1943. Ten-day, monthly and quarterly data is presented tabularly and graphically for six stations in each of 5 zones and for each zone for the period from July 1942 through June 1943. A brief summary of the drought period is given for each zone. This drought extended to neighboring countries and is illustrated by data from ten stations in Argentina. *Subject Headings:* **1. Drought 2. Precipitation data 3. Uruguay.**

**3C–107** 551.506.3:551.577.38 551.579

*Sudriers, Víctor B., **Las sequías en nuestro país (Uruguay).** [Drought in our country (Uruguay).] *Revista Meteorológica*, Montevideo, 3(11):234–250, July **1944.** 2 fold. diagrs , fold. table. **DWB**—A general discussion with particular reference to the drought of 1942 and the problem of irrigation. The table presents annual average rainfall for each of the 19 departments and for the Republic for the period 1906–1942. Diagr. No. 1, based on information from various sources, shows the wide variation in average rainfall for a 59-year period (1883–1942). Diagr. No. 2 is curve of accumulated runoff for the Río Negro for 1908–1942. *Subject Headings:* **1. Drought 2. Runoff 3. Long period records 4. Uruguay.**

**3C–108** 551.577.38:63

Tiscornia, José T., **Estudio de frecuencia de sequías en el Uruguay, en relación a los perjuicios que pueden ocasionar a las industrias agropecuarias.** [Study of drought frequency in Uruguay in relation to the damage to the cattle and agricultural industries.] *Revista Meteorológica*, Montevideo, 2(8):343–370, Oct. **1943.** tables. **DWB**—Data for a 37-year period (1906–1943) was used in this study of drought in seven departments of Uruguay. Summary shows that the situation was worst in Paysandú and best in Montevideo. Study of cases of rainfall between 20 and 40 mm and study of cases 80% or more of normal show that in spite of the amount of rainfall it is possible to have droughts. Author emphasizes the fact that the study has been made only of those droughts which could affect the cattle and agricultural industries. The data has been summarized in tables. *Subject Headings:* **1. Drought frequencies 2. Agricultural meteorology 3. Animal husbandry 4. Uruguay.**

**3C–109** 551.582.2(899)

*Uruguay. Dirección General de Estadística, **Anuario Estadístico de la República Oriental del Uruguay . . . año 1883–1939 [v. 2], 1940–1942 [v. 2].** [Statistical annual of the República Oriental del Uruguay . . . year 1883–1939 (Pt. 2), 1940–1942 (Pt. 2).] Montevideo, **1885–1943.** 64 Vols. plates, maps, tables. **DPU**—These volumes are issued in two parts, the meteorological data being found in the first part. Pt. 1 of Vol. 33 (p. 3–9) contains summaries of the periods 1906–1924 and 1911–1924 of temperature, pressure, wind, rainfall, insolation, evaporation, etc. Pt. 1 of Vol. 49 presents for 1933–1942 (p. 1–3) summaries of observations of the above data as well as of hail, frost, fog and electric storms. In addition, annual rainfall for each department for the period 1933–1942 and the average for 1906–1933 are given. *Subject Headings:* **1. Climatic data 2. Uruguay.**

**3C–110** 551.582.2(899)

*Uruguay. Instituto Meteorológico Nacional, **Datos del Observatorio Central de Montevideo . . . Años 1906 a 1924.** [Data from the Central Observatory at Montevideo . . . Years 1906 to 1924.] [Montevideo?] [n.d.] 48 p. chiefly tables. **DWB** Monthly averages for the period are given for thrice-daily observation of temperature in a shelter, temperature unsheltered (1907–1924), barometric reduction, vapor pressure, relative humidity, wind, precipitation, evaporation, ozone, insolation and days per month with atmospheric phenomena (lightning, thunder, haze, fog, hail and frost). Coordinates and altitude of the station are given. *Subject Headings:* **1. Climatic data 2. Uruguay.**

**3C–111** 551.582.2(899)

*Uruguay. Instituto Meteorológico Nacional, **Datos del Observatorio Central, Montevideo.—Río de la Plata. Puerto de Montevideo . . . 1906–1929.** [Data from the Observatorio Central, Montevideo.—Rio de la Plata. Puerto de Montevideo . . . 1906–1929.] [Montevideo, **1910–1930.**] 21 Vols. , diagrs. on 4 fold. pl. and atlas. **DPU**—For the Central Observatory, monthly averages are shown for temperature in a shelter, open air temperature, barometric reduction, vapor pressure, relative humidity, cloudiness, wind, precipitation, evaporation, ozone, insolation and days per month with lightning, thunder, haze, fog, hail and frost. For the Río de la Plata—Port of Montevideo—monthly averages are given for the height, temperature and salinity of water. The data are also presented diagrammatically. For some years the observations at the port were made daily (but irregularly). *Subject Headings:* **1. Climatic data 2. Montevideo, Uruguay. I. Bazzano, Hamlet.**

3C–112 551.506.9 551.582(899)

*Uruguay. Instituto Nacional Físico-Climatológico, **Resumen y discusión de la observaciones meteorológicas del Observatorio Central, período 1901–1915.** [Resumé and discussion of the meteorological observations at the Central Observatory, 1901–1915.] Montevideo, Tip. Moderna, **1917.** 19 p. numerous tables. **DPU, DWB** Contains a brief summary of the founding and development of the Observatorio Central in the Prado at Montevideo, its location and actual conditions of meteorological work and installation and discussion of elements observed. The results of the observations are set forth in the following tables: 1) annual rainfall amount, duration in hours, rainfall distribution by intensity, largest number of consecutive days with rainfall <one mm and with 1 mm or more; 2) average annual humidity, evaporation, cloudiness and days with hail, frost, fog, wind direction and force, interhourly calms; 3) wind frequency at 7, 14 and 21 h; 4) monthly and seasonal rainfall; 5) seasonal distribution of days with hail, frost and fog and 6) other tabular material including mean, maximum and minimum temperature for 12 stations and annual rainfall for 52 stations. *Subject Headings:* **1. Climatic data 2. Meteorological observatories 3. Montevideo, Uruguay 4. Uruguay.**

3C–113 551.506.1(058)(899)

*Uruguay. Servicio Meteorológico, **Boletín Anual Meteorológico. Años 1930–1943.** Montevideo, **1936–1947.** 6 Vols. charts, chiefly tables. Title varies. **DWB**—For the first years all data (except rainfall) is from the Prado station in Montevideo. The later issues contain data from that station and other stations in Uruguay. (*See abstract* No. 3.2–27 in Feb. 1952 *Meteorological Abstracts.*) *Subject Headings:* **1. Climatic data 2. Annual reports 3. Uruguay.**

## V. ARGENTINA

3C–114 551.582(82)

Argentina. Comisión Nacional de Climatología y Aguas Minerales, **Climatología regional, Provincia de Córdoba.** [Regional climatology. Córdoba Province.] By Miguel Sussini and others. (In its **Climatologia de la República Argentina.** Buenos Aires, **1940.** Vol. II. charts, diagrs., photos, tables, 85 refs.) **NNA**—Chapters take up: physical geography of the province of Córdoba, climatic conditions, weather and seasons, medical climatology and mountain climate in general and of the sierras of Córdoba especially. Many graphs and some brief summary data are included. *Subject Headings:* **1. Climatology 2. Córdoba Province, Argentina. I. Sussini, Miguel.** —*H.P.K.*

3C–115 551.5:058.06 551.509.5

Argentina. Dirección de Meteorología. **Memoria correspondiente al ejercicio de 1924, . . . 1927, . . . 1929.** [Report for the year 1924, . . . 1927, . . . 1929.] Buenos Aires, **1925–1929.** 3 Vols. map, tables. **DPU, DWB**—Each year's report gives a resumé of the work of the various sections (names and number vary) of the Meteorological Service. That for 1924 also gives a table showing distribution of meteorological instruments according to stations, a map showing location of stations according to class, days and places where frost was observed and isohyetal charts. The report for 1927 includes a table showing monthly percentage of accuracy for 24 and 36 hour forecasts of weather and temperature made at 8 a.m. and 8 p.m. and the annual percentage of accuracy for several regions. *Subject Headings:* **1. Annual reports 2. Forecast verification 3. Meteorological services 4. Argentina.**

3C–116 551.582.2(82)

*Argentina. Dirección de Meteorología, Geofísica e Hidrología. **Estadísticas climatológicas. Valores promedios y absolutos registrados en el período 1928–1937.** [Climatological statistics. Average and absolute values registered in the period from 1928–1937.] *Argentina. Dirección de Meteorología, Geofísica e Hidrología, Ser. B, Publicación* No. 1, **1944.** 121 p. chiefly tables. **DWB**—Monthly summary of meteorological observations for approximately 103 stations for the period 1928–1937. Gives the units used for measuring and estimation of meteorological elements. Order of the station; classification as to whether it is an aerological, climatological, evaporation, agrometeorological or synoptic station; coordinates and altitude are also given. *Subject Headings:* **1. Climatic data 2. Long period records 3. Argentina.**

3C–117 551.501:551.593.55

Argentina. Dirección de Meteorología, Geofisíca e Hidrología, **Salida y puesta del sol y duración del crepuscuolo civil en cualquier punto de la República Argentina.** [Rising and setting of the sun and duration of twilight at any place in the Argentine Republic.] Buenos Aires, **1944** [n.p.] diagr. **DLC**—An explanation, followed by an example, shows how the graph may be used to determine the hour of the sun's rising and setting and the length of twilight at any particular place. Useful for

working sunshine duration and actinometric records. *Subject Headings:* **1. Nomograms 2. Twilight duration 3. Argentina.**

**3C–118** 551.509.3

Argentina. Dirección General de Navegación e Hidrografía, **Predictor local del tiempo.** [Local weather forecaster.] 3rd ed. [Buenos Aires] **1948.** 39 p. graphs, tables. **DWB**—Emilio L. Díaz has used 26,000 meteorological observations taken at 18 stations on or near the coast of Argentina during a period of four years and 400 observations taken in the summer in Graham Land (dates not given) as a basis of local forecasting techniques. Tables and nomograms are included and various examples given to show the forecaster how to make use of this material. *Subject Headings:* **1. Objective forecasting techniques 2. Argentina. I. Diaz, Emilio Luis.**

**3C–119** 551.582(82)

*Argentina. Oficina Meteorológica, **Anales de la Oficina Meteorológica Argentina . . .** Buenos Aires, **1893–1913.** 17 Vols. figs., charts, tables. **DLC, DWB**—Each volume deals with a different part of the country, e.g., Vol. I—Buenos Aires, Vol. XVI and XVII—South Orkney Islands. Vol. I (1878) includes establishment and organization of the Oficina Meteorológica, early observations in Buenos Aires (dating back to 1801) (*see item* 3C–138 below) and analysis and data of climate of Buenos Aires: temperature, pressure, humidity, cloudiness, (quantity, cloudy days and clear days), rainfall, winds (frequency, average direction, force) and storms. Wind roses and graphs are included. Vol. XVI (1905) contains results of observations at Laurie Island, South Orkneys in the year 1904. Usual elements and solar radiation, sea temperature, visibility and hourly frequency of snow, rain, hail, mist or fog, glazed frost, ice crystals, silver thaw, haze, snow drifting, squalls and lunar halos and coronas summarized for month and year. Monthly and seasonal daily variation of temperature, pressure (atmospheric and vapor), relative humidity, isobaric charts, annual march of temperature and barometric pressure, temperature and pressure wind roses, isothermal chart, distribution of barometric pressure for selected days. Some volumes contain summaries for a year or more for the entire country. *Subject Headings:* **1. Climatology 2. Climatic data 3. Argentina. I. Gould, Benjamin Apthorp. II. Davis, Walter Gould.**

**3C–120** 551.506.1:551.582.2(82)

*Argentina. Oficina Meteorológica Nacional, **Boletín mensual. Año 1–8, 1916–1923.** [Monthly Bulletin. Year 1–8, 1916–1923.] Buenos Aires, **1916–1926.** 8 Vols. charts, diagrs., tables. **DWB**—Daily, 10-day, monthly and annual data for: pressure, temperature, humidity, wind, rainfall, frost, cloudiness for varying number of stations; monthly and annual rainfall for stations grouped by provinces; daily, 10-day, monthly and annual data from magnetic observatory at Pilar; daily (irregular) monthly seismological observations from a number of stations; daily, 10-day, monthly and annual hydrometric data from a varying number of stations on the various rivers; discussion of cyclones and anticyclones (tabularly and graphically illustrated); graphs showing monthly fluctuations of rivers; charts showing monthly average temperature, pressure and winds; absolute maximum and minimum temperatures; rainfall amount, excessive and deficient rainfall. Coordinates and altitude of stations given. Number of stations, arrangement of data and type of explanatory material varies from one volume to another. *Subject Headings:* **1. Observational data 2. Climatic data 3. Argentina.**

**3C–121** 551.5:06:629.13

Argentina. Secretaría de Aeronáutica de la Nación, **La aeronáutica nacional al servicio del país.** [National aeronautics in the service of the country.] [Buenos Aires] **1948.** 345 p. figs., charts, graphs, photos. **DWB**—Chapter entitled "Meteorología y problemas conexos" [Meteorology and related problems] on p. 81–90 (6 figs., 2 charts) contains the history and organization of the Servicio Meteorológico Nacional and the Servicio Meteorológico de Aeronáutica for public interest and aviation, respectively. A colored chart (p. 36–37) shows the organization of the Secretaría de Aeronáutica and one in black and white (p. 52–53) locates the major airports. *Subject Headings:* **1. Aeronautical meteorological services 2. Argentina.**

**3C–122** 551.582:656.6(82)

Argentina. Servicio Hidrográfico, **Derrotero argentino.** [Argentine pilot guide.] 3rd ed. Buenos Aires, Talleres Gráficos G. Tauber & Cía., **1936–1938.** 2 Vols. figs., charts, photos, tables. **DLC**—Pt. I covers the Río de la Plata—both north and south coasts. The discussion of climate for Argentina as a whole (p. 70–83) includes atmospheric circulation, weather variations, relative humidity, precipitation, snow, temperature, frost and mist. Isobaric and temperature charts (annual average) and typical charts of cyclones and anticyclones are included. Pt. II deals with the Atlantic coast from Cape San Antonio to Cape Virgenes and Point Dungeness. A general discussion of the wind, pressure, fog, squalls and currents will be found on p. 1–3. The climatology of various

ports is described: Mar del Plata (p. 29), Nicochea (p. 44), Bahía Blanca (p. 50), San Blas (p. 83), Carmen de Patagones (p. 92–93) and others. Tables summarizing meteorological data for Madryn and Deseado (1902–1919) are included. Coordinates for these and above stations are given. *Subject Headings:* **1. Pilot guides 2. Climatology 3. Marine climatology 4. Argentina (east coast).**

**3C–123** 551.506:656.2(82)

Argentina. Servicio Hidrográfico, **Derrotero Argentino de los Ríos Paraná, Paraguay y Uruguay.** [Argentine pilot guide of the Paraná, Paraguay and Uruguay Rivers.] 4th ed. Buenos Aires, **1942.** 248 p. figs., photos, tables. **DLC**—Contains geographic coordinates, height and monthly and annual averages of usual meteorological elements including wind frequency, for a number of ports. *Subject Headings:* **1. Pilot guides 2. Marine climatology 3. Argentina.**

**3C–124** 551.506(82) 551.582.2(82)

*Argentina. Servicio Meteorológico Nacional, **Anales Climatológicos. Año 1928–1948.** [Climatological annuals. Year 1928–1948.] *Argentina. Servicio Meteorológico Nacional, Ser. B,* 1st Sec., 1st Pt., No. 1–10, **1933–1949?** 10 Vols. all tables. [holdings inc.] **DLC, DWB**—Each annual contains the following data for 175 stations: 1) monthly averages of temperature, relative humidity, vapor pressure and cloudiness, based on thrice-daily observations; 2) wind force (Beaufort scale) and frequency from 8 directions; 3) total and maximum precipitation and 4) monthly frequencies of temperature, precipitation, wind, snow, mist, fog, hail, cloudy and clear days, and violent showers of rain. The geographic coordinates, location as to province or territory and the classification of each station is given. *Subject Headings:* **1. Annual reports 2. Climatic data 3. Argentina.**

**3C–125** 551.506.8(92)

*Argentina. Servicio Meteorológico Nacional, **Boletín Fenológico.** No. 1–3, June/Dec. **1947**–June/Dec. **1948.** graphs. **DWB**—Includes phenological data for a number of plants and climatic data for Buenos Aires (5-day means) of daily maximum and minimum temperature, rain, effective radiation and relative humidity and monthly wind roses for seven-months periods. *Subject Headings:* **1. Phenology 2. Climatic data 3. Agriculture 4. Argentina.**—*C.E.P.B.*

**3C–126** 551.509.21

*§Argentina. Servicio Meteorológico Nacional, **Carta del tiempo.** [Weather map.] Buenos Aires, **1902–1951.** 113 Vols. charts, tables. **DWB**—A daily weather map (July 1, 1939 as an example) contains the following information: synoptic chart with explanatory key, weather forecast for six regions and the country as whole, navigation forecast for two areas, condition of the rivers, observations for seven elements for the federal capital at 8 a.m. on the day of issue and for three elements for the preceding 24 hours, standard synoptic observations (according to the international code) of elements for 109 stations for 8 a.m. on the day of issue, pilot balloon data for 10 stations and a list of approximately 1550 raingage stations with symbols indicating rainfall in the 48 or 24 hour period preceding 8 a.m. of the day of issue. *Subject Headings:* **1. Synoptic charts 2. Observational data 3. Argentina.**

**3C–127** 551.506.1:551.591.2(82)

*Argentina. Servicio Meteorológico Nacional, **Estadísticas de visibilidad. Período 1934/45.** [Visibility statistics. Period 1934/45.] *Argentina. Servicio Meteorológico Nacional, Ser. B,* 1st. Sec., 1st Pt., No. 10, **1948.** 94 p. chiefly tables. **DWB**—Observations were begun by the Meteorological Service in Aug. 1933. Monthly and annual frequency of different degrees of visibility (scale 0–9) observed thrice-daily at 176 stations are shown tabularly for a 12-year period (1933–1945). *Subject Headings:* **1. Visibility 2. Observational data 3. Argentina.**

**3C–128** 551.506.1(82)

*Argentina. Servicio Meteorológico Nacional, **Resumen Mensual del Tiempo.** [Monthly summary of the weather.] Buenos Aires, **1941–1946.** 6 Vols. figs., charts, tables. [holdings inc.] **DWB**—Usual monthly data. Large colored isohyetal chart, list of precipitation stations, charts showing cyclone and anticyclone tracks, pressure and temperature anomalies, fronts and surface wind roses. *Subject Headings:* **1. Monthly summaries 2. Climatic data 3. Argentina.**

**3C–129** 551.577551.577.38

Argerich, Guillermo, **Contribución al estudio de lluvias y sequías en la zona de Bahia Blanca y su influencia. S. W. de Buenos Aires y S. E. de la Pampa.** [Contribution to the study of rainfall and drought in the Bahía Blanca zone and their influence. S. W. of Buenos Aires and S. E. of La Pampa.] *Sociedad Rural Argentina, Buenos Aires, Anales,* 76(3):265–279, March **1942.** graphs, map, tables. **DA**—A study based on precipitation data (1908–1939) for 12 stations in the Bahía

Blanca area. The data are presented in tables and graphs. *Subject Headings:* **1. Precipitation 2. Drought 3. Argentina.**

**3C–130** 551.515 551.57 (82,83)

Barrera V., Humberto, **Las tempestadas en la alta Cordillera.** [Storms in the high Cordillera.] *Revista Geográfica Americana*, Buenos Aires, 25(153):313–319, June **1946.** 7 photos. **DLC**—Personal observations by the author in the central Cordillera and in southern Argentina and Chile. A storm is defined as an atmospheric perturbation with electric discharges accompanied by heavy wind, rain, hail or snow. Then follows a discussion of atmospheric phenomena—whirlwinds, tornados, cyclones and waterspouts—and conditions necessary for their formation; hydrometeors—mist, dew, clouds, precipitation and hail; and electric phenomena. Examples of occurrence of these different phenomena are cited. *Subject Headings:* **1. Atmospheric disturbances 2. Hydrometeors 3. Argentina 4. Chile.**

**3C–131** 551.524.3

Bazzari, Carlos A., **La temperatura en la ciudad de Buenos Aires en el período noviembre 1942–febrero 1943.** [The temperature in the city of Buenos Aires in the period November 1942–February 1943.] *Revista Meteorológica*, Montevideo, 3(9):19–30, Jan. **1944.** 11 figs. **DWB**—Various comparisons are made between the unusually high temperatures of this four-month period and the average and absolute values for a 35-year period (1906–1940). No data are included but the text is illustrated with graphs. *Subject Headings:* **1. Extreme temperatures 2. Buenos Aires, Argentina.**

**3C–132** 551.513:551.588.2

Boffi, Jorge Alberto, **Efecto de la Cordillera de los Andes en la circulación general del aire sobre la República Argentina.** [Effect of the Andean Cordillera on the general circulation of air over the Argentine Republic.] *Sociedad Científica Argentina, Anales*, 147(3):126–140, March **1949.** 5 figs., 3 tables, ref. English summary p. 126. **DLC**—Dynamic effect of Andes on general circulation is considered, with particular attention to seasonal effect on cyclonic storm trajectories, cyclogenesis, deepening and filling, air flow aloft and "statistical stability" of wind from various directions. Carefully drawn charts and diagrams for Argentina are included. (*Same abstract* as No. 2.2–67 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. General circulation 2. Orographic effects 3. Argentina.**—*M.R.*

**3C–133** 551.586:63(82)

§*Bosso, José Alberto and Burgos, Juan Jacinto, **Condiciones agroclimáticas de la región de Carmen de Patagones.** [Agroclimatic conditions of the Carmen de Patagones region.] *Revista Argentina de Agronomía*, Buenos Aires, 15(3):139–159, Sept. **1948.** charts, 6 tables, refs. **DA**—Pt. I contains descriptions of the climate as given by Darwin, Spegazinni and Hauman-Merck Pt. II deals with the material and methods used in this work. Pt. III is a detailed survey of the agroclimatic characteristics of Carmen de Patagones which includes a description of various meteorological elements (frost, precipitation, cloudiness and wind) and a discussion of the causes of the regionalism of the climate. Pt. IV outlines the agricultural possibilities of the area. Some of the data is presented in the following tables: 1) average temperature, number of hours $\geq 21°$, number of hours $\leq 7°$ for the seasons, year and January and July for eight stations (1902–1946), 2) last frost in spring, first frost in autumn, frost in winter and frost free period for same stations and period, 3) seasonal humidity, cloudiness and precipitation and annual precipitation for same stations and period, 4) seasonal wind frequency for eight stations for 17 years. Synoptic charts are drawn for 9 nights on which there was exceptional frost. *Subject Headings:* **1. Agricultural climatology 2. Carmen de Patagones, Argentina.**

**3C–134** 551.58:551.501.6

Brazol, Demetrio, **El climograma termodinámico, guía para analizar y corregir el clima.** [The thermodynamic climogram, guide for analyzing and modifying climate.] Buenos Aires, Talleres Gráficos de G. Kraft, **1949.** 60 p. unchecked. *Subject Headings:* **1. Climatology 2. Graphical presentation 3. Argentina. I. Argentina. Círculo de Aeronáutica.**

**3C–135** 551.582:63(82)

Burgos, Juan Jacinto, **Características del clima de La Plata y algunas de sus consecuencias fitoecológicas.** [Climatic characteristics of La Plata and some of their plant ecological results.] *Revista Argentina de Agronomía*, Buenos Aires, 11(2):116–128, June **1944.** 2 diagrs., 2 plates, 7 tables, refs. **DA**—Compares La Plata, Buenos Aires, Pereyra, San Miguel and Punto del Indio as to temperature, rainfall and humidity. Mentions types of plants most suitable for each area. The

data are summarized for months or seasons and for varying periods (10 or 25 years). *Subject Headings:* **1. Climatology 2. Plant ecology 3. La Plata, Argentina.**

**3C–136** 551.585(82)

Burgos, Juan Jacinto and Vidal, Arturo L., **Los climas de la República Argentina, ségun la nueva clasificación de Thornthwaite.** [The climates of the Argentine Republic according to Thornthwaite's new classification.] *Meteoros*, Buenos Aires, 1(1):3–32, Jan. **1951.** 8 figs., 6 tables, 29 refs. **DWB**—THORNTHWAITE's method of potential evapotranspiration is used to analyze the climate of Argentina, with particular reference to the relationship between vegetation and climatic zones, to describe the water balance and to classify the climate of Argentina. The precipitation and temperature data provided by the Argentine meteorological network have been used; actual measurement of evapotranspiration by means of "evapotranspiration tanks" has not been carried out. Maps showing water surplus, water deficiency, moisture regions, seasonal variations of moisture efficiency, thermal regions and the summer concentration of moisture efficiency are presented. A close correspondence in values for soil moisture was found between the results obtained by the Thornthwaite method and those obtained by actual calculations of soil moisture at several localities in Argentina. After analyzing the various methods of climatic classification applied to classify the Argentine climate, the authors conclude that THORNTHWAITE's method shows the best correspondence with the vegetation zones. The article presents a complete description of method of potential evapotranspiration and the necessary data and nomograms for making calculations. (*Same abstract* as No. 2.11–170 in Nov. 1951, *Meteorological Abstracts.*) *Subject Headings:* **1. Climatic classification 2. Evapotranspiration 3. Argentina.**—*I.L.D.*

**3C–137** 551.582(82)

Burmeister, Hermann, **Description physique de la République Argentine. Tome II.** [Physical description of the Argentine Republic. Vol. II.] Paris, F. Savy, **1876.** 412 p. fold. map, tables. Translated [from German] by E. DAIREAUX. **DWB**—Book III (p. 1–150) contains a survey of the climate of the cities of Buenos Aires, Mendoza, Paraná, Córdoba, Tucumán, Pilciao and Bahía Blanca with detailed descriptions of temperature, humidity, clouds, wind, rain, pressure, storms, earthquakes and electrical phenomena. Data is summarized for Buenos Aires, 1857–1873; for Mendoza, 1852–1858; for Paraná, 1858–1859. Concludes that a comparison of the above seven stations shows that Argentina's east coast has the littoral type of climate and the western part has the continental type. *Subject Headings:* **1. Climatology 2. Climatic classification 3. Argentina. I. Daireaux, E.** (*trans.*)

**3C–138** 551.506(82)

C., D. A. S., **Observaciones meteorológicas hechas en Buenos Aires desde el 1° de agosto hasta el 24 de setiembre de 1801.** [Meteorological observations taken in Buenos Aires from August 1 to September 24, 1801.] *Argentina, Oficina Meteorológica, Anales*, Vol. I, **1878. DWB**—On p. 30–31 will be found daily observations of temperature, pressure, humidity, dominant winds and condition of the atmosphere. *Subject Headings:* **1. Fragmentary climatic data 2. Buenos Aires, Argentina.**

**3C–139** 551.584.3(82)

Cagliolo, Alberto, **Estudio microclimático de pendientes en el sudeste de la provincia de Buenos Aires (Dionisia).** [Microclimatic study on slopes in the southeast part of the province of Buenos Aires (Dionisia).] *Meteoros*, Buenos Aires, 1(2–3):134–149, June **1951.** 7 figs., 9 tables, refs. Spanish and English summaries p. 134. **DWB**—A microclimatic study undertaken in the southeast province of Buenos Aires from 1939–1943 to determine the distribution of the insect carrier of the potato blight. The location of the area, its importance for potato growing and a summary of its climate are given. Five meteorological shelters were installed (at the four points of the compass and in the center of a hillock) and their equipment is described. An analytical study was made of the following: maximum and minimum temperature, minimum temperature of radiation, and minimum temperature of soil surface; relative and specific humidity of the air; wind; humidity of the soil and nocturnal inversion of temperature. The study is accompanied by several tables. Among the conclusions were these: 1) highest temperatures usually found on the north slope, 2) the south slope is the dampest slope (both in air moisture and soil moisture). *Subject Headings:* **1. Agricultural climatology 2. Microclimatology 3. Potato blight 4. Argentina.**

**3C–140** 551.583.3

Caldenius, Carl Carlzon, **Las glaciaciones cuaternarias en la Patagonia y Tierra del Fuego. Una investigación regional estratigráfica y geocronológica. Una comparación con la escala geocronológica sueca.** [The quaternary glaciations in Patagonia and Tierra del Fuego. A regional,

stratigraphical and geochronological investigation. A comparison with the Swedish time-scale.] *Geografiska Annaler*, 14:1–164, **1932.** 42 plates. **DLC.** Also on microfilm at **DWB**—A fourfold glaciation, mostly by valley glaciers, is dated by varves and considered to represent the four stages of Würm, the last two representing Gotiglacial and Finiglacial of Scandinavia. (*Same abstract* as No. G–88 in July 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Climatic changes 2. Quarternary climates 3. Argentina.**—*C.E.P.B.*

**3C–141** 551.583.3 551.311.15

Caldenius, Carl Carlzon, **Las glaciaciones cuaternarias en la Patagonia y Tierra del Fuego, y sus relaciones con las glaciaciones del hemisferio boreal. Estudio geocronológico.** [Quaternary glaciations in Patagonia and Tierra del Fuego and their relation to the glaciation of the Northern Hemisphere. Geochronological study.] *Sociedad Científica Argentina, Anales*, 113(2):49–70, Feb. **1932.** chart. French summary p. 49. **DLC**—After some consideration of the Quaternary period and the existing knowledge of this period, the author discusses a new method of geochronological research which was used during two expeditions in South America (1925–1926, 1927–1928). The topography, geology and physical characteristics of Patagonia are described in detail. A study of the glacial deposits (or varves) which were excavated, leads the author to conclude that the annual variation of solar radiation ought to be similar over the entire earth. The glacial deposits in southern Argentina are located on a chart. *Subject Headings:* **1. Quarternary climates 2. Geochronology 3. Patagonia, Argentina.**—*From author's abstract.*

**3C–142** 551.582(82) 91

Canosa, Ada S. de and Solano, María Esther, **La geografía por la observación, departamento de Las Heras, provincia de Mendoza.** [Geography by observation, department of Las Heras, province of Mendoza.] *Mendoza, Argentina. Universidad Nacional de Cuyo. Boletín de Estudios Geográficos*, 1(3):41–77, **1949.** 8 charts, 20 photos, tables, biblio. p. 74–77. **DLC**—A detailed survey of the department of Las Heras in the province of Mendoza and treating the following topics: location, geology, orography and hydrography, climate, etc. The section on climate (p. 53–54) presents a general picture of the situation accompanied by brief summary tables of meteorological elements observed at Villavicencio and Plumerillo. The geographic coordinates and altitude of the stations are given. One chart presents isotherms and isohyets for Jan. and July for Las Heras. *Subject Headings:* **1. Climatology 2. Geography 3. Las Heras, Argentina.**

**3C–143** 551.578.7:551.577.61

Capitanelli, Ricardo G., **El problema general del granizo y pedrisco, particularmente en Mendoza.** [The general problem of small and large hailstones, particularly in Mendoza.] *Mendoza, Argentina, Universidad Nacional de Cuyo, Boletín de Estudios Geográficos*, 1(2):53–66, **1949.** 2 tables, refs. **DLC**—Between 1929 and 1948, ½ of damage to vineyards by weather disasters was caused by hail. Definitions of types of hail. Conditions for formation of hail, with the local or convective type being found at Mendoza. Methods of hail protection, negative results. One table gives percentage of damage to vineyards from all causes and one for damage from hail only. Data was collected from 17 stations for period from 1930 to 1949. (*Same abstract* as No. D–236 in April 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Hail damage 2. Viticulture 3. Argentina.**

**3C–144** 551.578.42(82)

Ceppi, Héctor, **Los estudios de nieve en la Cordillera y Patagonia.** [Studies of snow in the Cordillera and Patagonia.] *GAEA, Sociedad Argentina de Estudios Geográficos, Anales*, 6:283–294, **1938.** charts, photos. **DLC**—Following a survey of the advantages and disadvantages of snow, the following topics are considered: difficulties in studying snow, a detailed program of study, snow surveys in other countries and the snow study being carried out in various parts of Argentina under the supervision of the Dirección de Meteorología and the Dirección General de Irrigación. Charts are included to show: 1) snowfall frequency, 2) location of meteorological stations and location of totalisers, 3) hydrometric stations and rain gages. *Subject Headings:* **1. Snow studies 2. Cordillera Region, Argentina 3. Patagonia, Argentina.**

**3C–145** 551.524(82) 551.577(82)

*Chavanne, Josef, **Die Temperatur- und Regenverhältnisse Argentiniens.** [Temperature and rain regime in Argentina.] *Deutsche Akademische Vereinigung zu Buenos Aires, Veröffentlichungen*, 1(7):3–40, **1902.** tables, charts. **DWB.** Reviewed in: *Monthly Weather Review*, 31(3):140–141, March **1903. DWB.** Also reviewed in: *Geographical Journal*, London, 29:677–678, **1903. DLC**—Reduced rainfall records to 40-year period (1861–1900) and temperature records to 45-year period (1856–1900) for 235 stations in Argentina. Some data from 12 neighboring stations. Annual and seasonal rainfall and temperature, temperature ranges and temperature anomalies, and characteristics of the vegetation are shown in charts. On the basis of complex climatological factors, Cha-

VANNE divides Argentina into nine regions. The zonda, a characteristic of the elevated steppes, is described. *Subject Headings:* **1. Temperature 2. Rainfall 3. Climatic regions 4. Argentina.**

**3C–146** 551.509.33:523.72

Clayton, Henry Helm. **The use of observations of solar phenomena in weather forecasting in Argentina.** *American Meteorological Society, Bulletin*, 4:34–37, 1923. **MH-BH**—Enunciates four rules about rises and falls of pressure following changes of solar radiation and their progressive movements. In the discussion PROF. MARVIN doubted the reality of fluctuations in the solar constant. (*Same abstract* as No. 2A–45 in Jan. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Solar radiation 2. Extended forecasting 3. Argentina.**—*C.E.P.B.*

**3C–147** 551.509.33.523.7

Clayton, Henry Helm. **World weather; including a discussion of the influence of variations of solar radiation on the weather and of the meteorology of the sun.** New York, Macmillan, 1923. 393+p. figs., plates, tables, refs. **DWB**—Chap. 10 (p. 215–269. 35 figs., 8 tables), "The sun and the weather," describes relations between daily and monthly changes of solar radiation and subsequent weather changes. Chap. 12 (p. 284–322. 12 figs., 4 tables, 11 refs.) deals with "Periodicity in the weather and in solar phenomena." Periodogram analysis of values of solar constant gave periodicities of 3.5, 5.6, 6.8, 9, 11 and 13 days. The 6.8 day period corresponds with a 7-day period in weather. The 11-year sunspot cycle in weather is also discussed. Part of Chap. 13 (p. 323–343. 11 figs.) is titled "Forecasting the weather. Forecasts based on the relation of the weather to solar changes" and describes weekly forecasts for Buenos Aires begun Dec. 12, 1918. Author states: "The correlation between the observed and predicted temperatures is not high, but the belief seems justified that, whenever full and accurate day-to-day values of solar radiation are available weather forecasts for all parts of the world may be made with an accuracy and for intervals not hitherto thought possible by scientific men." (*Same abstract* as 2A–46 in April 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Solar radiation 2. Sunspots 3. Periodicities 4. Extended forecasting 5. Buenos Aires, Argentina.**—*C.E.P.B.*

**3C–148** 551.510.42(82)

Colman, Lerner M., **La radicación de industrias en la ciudad.** [The locations of industries in the city.] *Revista Medicina y Ciencias Afines*, Buenos Aires, 4:336–338, **1942.** refs. English summary. **DSG**—Health aspects. Desirability of having an industrial section away from prevailing winds to avert contamination of residential and business areas. (*Same abstract* as A–112 in Jan. 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Atmospheric pollution 2. City planning 3. Public health 4. Argentina.**—*H.P.K.*

**3C–149** 551.577.38

***Consideraciones de orden meteorológico sobre la sequía registrada en los ultimos meses.** [Meteorological analysis of the drought experienced in recent months.] *Argentina. Dirección de Meteorológia, Geofísica e Hidrología. Publicación Miscelánea*, Buenos Aires, No. 31, **1938.** 13 p. charts, graphs, tables. **DWB**—Causes of the drought, an analysis of some rainfall series, intensity of the drought and area affected are included in the discussion. A table gives monthly and average rainfall for Sept.–Dec. 1937 and Jan.–Feb. 1938 and rainfall normals for 1915–1927 for 38 stations, charts show excess and deficiency of rainfall in period under study as compared with normal rainfall and graphs present moving averages for the Federal District, Tucumán, La Banda, Corrientes, Ceres, Gral Villegas, Bahía Blanca and Gral Acha. *Subject Headings:* **Drought 2. Precipitation data 3. Argentina.**

**3C–150** 551.582(82)

Corte, A. E., **Características climáticas de los ríos de Cuyo y sus relaciones.** [Climatic characteristics of the rivers of Cuyo and their relations.] *Mendoza, Argentina. Universidad Nacional de Cuyo, Boletín de Estudios Geográficos*, 1 (1):9–14, 1948. graphs, 9 refs. **DLC**—The purpose of this study was to determine the climatic relations between the principal rivers of Mendoza and San Juan and also to determine the relation between the general climatic conditions of these rivers and precipitation in Córdoba. The author concludes that the rivers do possess similar climatic conditions, although the Río San Juan is separated from the Río Colorado by 700 km. Graphs for these and three other rivers show annual discharge. There is no relation between the flow of the rivers of Cuyo and rainfall in Córdoba with solar activity. *Subject Headings:* **1. Climatology 2. Hydrology 3. Cuyo, Argentina.**

**3C–151** 551.577:633.51(82)

Cross, William E., **El régimen de lluvias en la primavera de Tucumán y su efecto sobre el cultivo del algodón.** [The spring rainfall regime in Tucumán and its effect on the cultivation of

cotton.] *Tucumán, Argentina. Estación Experimental Agrícola, Revista Industrial y Agrícola de Tucumán*, 28(10/12):233–234, Oct./Dec., **1938. DA**—After a study of 55 years of rainfall data for Tucumán, the author concludes that the droughts of the several preceding years are exceptional and states reasons why he believes that the province is ideal for cotton growing. No data given. *Subject Headings:* **1. Rainfall 2. Cotton 3. Tucumán Province, Argentina.**

**3C–152** 551.555.3:551.555.8(92)

Davis, William Morris, **The foehn in the Andes.** *American Meteorological Journal*, 3(11):507–516, March **1887.** 5 tables, ref. **DLC**—Description of local hot winds of föhn and sirocco type according to narratives of several travelers through South America. Some observational data is presented. Explanations as to the origin of these winds are suggested. (*Same abstract* as No. 2G–26 in July 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Special winds 2. Föhn winds 3. Zonda 4. Sirocco 5. Argentina.**—*N.A.S.*

**3C–153** 551.555.3(82)

Davis, Walter Gould, **Climate of the Argentine Republic.** Vol. 3. **1908.** tables, 44 plates. **DWB**—On p. 677–678 it is indicated that in the region of the Andes a hot and dry wind has been observed. It blows from N or NW and has the local name "zonda." Plants are often burned by this wind which occurs most frequently in the spring. (*Same abstract* as 2G–77 in July 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Special winds 2. Zonda 3. Argentina.**—*N.A.S.*

**3C–154** 551.582(82)

*Davis, Walter Gould, **Climate of the Argentine Republic.** 2nd ed. Buenos Aires, **1910.** 111 p. numerous charts, graphs and tables. Spanish ed., **1909. DWB**—This exhaustive monograph, one of the most important discussions of Argentine climate, was originally written for the Live Stock Census of Argentina taken in 1908. By way of introduction, the author divides the country 1) into four regions based on climatic variations—Littoral, Mediterranean, Andean and Patagonian; 2) into two systems as regards the atmospheric circulation—the continental or cyclonic north of the Río Negro and the Antarctic or anticyclonic south of that river and 3) into four high pressure areas and six low pressure areas. A discussion of seasonal and annual temperature for the 10-year period beginning with 1898 (illustrated with nine isothermal charts) and rainfall distribution (illustrated with three isohyetal charts) follows. The bulk of the work consists of a thorough analysis of climatological factors for each zone accompanied by numerous tables. In addition, there is a synoptic table of the flow of rivers and lakes; a table showing the magnetic declination of a number of stations on Jan. 1, 1908; seasonal and isobaric charts; graphs showing diurnal and annual variations of several elements for each zone; wind roses for three zones and graphical presentation of some data from the South Orkneys. *Subject Headings:* **1. Climatology 2. Climatic regions 3. Statistical analysis 4. Climatic data. I. Argentina. Oficina Meteorológica.**

**3C–155** 551.582(82)

*Davis, Walter Gould, **Ligeros apuntes sobre el clima de la República Argentina.** [Brief annotations on the climate of the Argentine Republic.] Buenos Aires, Pablo E. Coni e hijos, **1889.** 254 p. 2 fold. charts, 25 plates, numerous tables. **DWB**—Thorough analysis of climatic conditions at 21 stations in Argentina accompanied by analyzed data for temperature, atmospheric pressure, humidity, rainfall and wind for all of the stations and data for cloudiness, terrestrial magnetism, earthquakes, solar brightness and ozone for some of the stations. The coordinates are given for each station. Period of record varies, the longest being for temperature at Buenos Aires (1805–1887). The following illustrative material is also included: graphs showing annual and daily variations of some elements for the several stations, wind roses for Córdoba and isothermal and isohyetal charts. *Subject Headings:* **1. Climatology 2. Climatic data 3. Argentina.**

**3C–156** 551.582(82)

*Davis, Walter Gould, **Servicio Meteorológico Argentino. Historia y organización con un resumen de los resultados.** [The Argentine meteorological service. History and organization with a summary of the results.] Buenos Aires, **1914.** 181 p. 76 charts, fold. map, extensive tables. Text in Spanish and English. **DWB**—A history of the Argentine meteorological service which was founded in 1872. Following a brief history of the service, the work of the Hydrometric Section is outlined, including surveys of the various river systems. A table lists 198 dates on which observations were made at several stations along the various rivers, height of gage and flow of water in $m^3$ sec. In reviewing the work of the Magnetic Section, attention is given to the establishment of the Pilar Observatory in 1904 and tables of monthly, annual and seasonal mean diurnal variation of magnetic declination for 1905–1914 are presented along with other data from this observatory. Finally, (written by Henry Helm Clayton) an analysis is made of atmospheric circulation and the weather in Argentina, covering such topics as: types of cyclones and anticyclones, cyclone tracks,

etc. Tables consist chiefly of rainfall and temperature data. Network of stations of different types; mean charts of temperature, pressure, wind and rainfall; tracks of cyclones and anticyclones and diurnal and semi-diurnal waves of pressure are among the graphical material included. *Subject Headings:* **1. Climatology 2. Atmospheric circulation 3. Meteorological services 4. Argentina. I. Argentina. Oficina Meteorológica. II. Clayton, Henry Helm.**

**3C–157** 551.524.37:63

Deasy, George F., **A tentative growing-season map of Argentina.** *Journal of Geography*, Chicago, 42 6):225–229, Sept. **1943.** 2 figs., table. **DLC**—Method of constructing a map of the growing season in Argentina and an analysis of the map. Data published by the U. S. Weather Bureau were used to construct a table showing: 1) length of period of record, 2) mean number of days in each month with minimum temperature of 32°F or below and 3) approximate length of the frost free season, in months. Data for 26 stations in Argentina, 2 each in Chile and Paraguay and one in Uruguay are given. The frost free season in Argentina varied from 12 months in the extreme northeast to less than 1 month in the southern Andes. A little over half of the country has a seven months frost free period—all of Mesopotamia and the Chaco and large sections of the Pampa and arid northwestern plains and mountains. The southern part of Argentina has a growing season of from four to seven months and most of the Andean Highlands has a growing season of less than four months. "Three factors control the distribution of frost free period: latitude, altitude and proximity to the sea." This paper presents a provisional map showing distribution of frost free periods. Map is correct in broad outline; more complete and accurate data are needed. *Subject Headings:* **1. Frost free periods 2. Growing season 3. Agricultural meteorology 4. Argentina.**

**3C–158** 551.586:63(02)

De Fina, Armando Leopoldo, **Los elementos climáticos y los cultivos.** [Climatic elements and crops.] 2nd ed. Buenos Aires, Editorial Sudamérica, **1945.** 258 p. 50 figs. Enciclopedia Agropecuaria Argentina, No. 29. **DWB**—A simple description of the climatic elements, namely: solar radiation, temperature, atmospheric pressure, winds, precipitation, relative humidity, frost, fog, etc. Methods for measuring them are suggested. Specific values and the behavior of these elements are illustrated by examples from Argentina. This is followed by a discussion of phenology including the relationship of temperature and of precipitation to phenological phases of plants, the heat constants and heat requirements of plants, of photoperiodicity and vernalization. *Subject Headings:* **1. Agricultural climatology 2. Phenology 3. Textbooks 4. Argentina.**—*I. L. D.*

**3C–159** 551.524.37

*De Fina, Armando Leopoldo, **Las heladas primaverales en Buenos Aires durante el período 1909 1933.** [Spring frosts in Buenos Aires during the period 1909–1933.] *Revista Argentina de Agronomía*, Buenos Aires, 2 6):57–77, Aug. **1935.** 4 graphs, 5 tables, 13 refs. **DA**—A study made of spring frosts in the city of Buenos Aires based on data from the meteorological observatory of Villa Ortúzar. The data are analyzed for 5-day periods and combined for 10-, 15-, and 20-day periods for the benefit of orchardists and florists. The intensity of frost is classified into 4 types (0°, −2°, −4°, −6°) and the number of days with frost in each 5-, 10-, 15-, and 20-year period is calculated. In the 25 years no frost was registered after Dec. 1. Daily observations taken at the surface and 10 cm above the surface show average temperature from Aug. 1 to Nov. 30 (average and absolute minimum), number of observations of frost at 0° and −4° and a summary for each class. Data are shown in graphs and tables. *Subject Headings:* **1. Frost 2. Buenos Aires, Argentina.**

**3C–160** 551.586

*de la Cruz, A. Concieção, **Estudio de la correlación clima, vegetación y suelo de la zona colindante con la cuidad de Tucumán. Clima, vegetación, suelos del graminoidetum tucumano.** [Study of the correlation of climate, vegetation and soil of the zone adjacent to the city of Tucumán. Climate, vegetation, soils of the Tucumán grasslands.] *Tucumán, Argentina. Universidad Nacional, Publicación* No. 483, **1949.** 113 p. tables, refs. **DWB**—The THORNTHWAITE classification of 1931, with its concepts of precipitation efficiency and temperature efficiency, is applied to a study of the climate, vegetation and soils of the region adjoining the city of Tucumán and a correlation is found between the P/E and T E values and the actual vegetation and soil conditions. Monthly rainfall for the period 1884–1923 and mean monthly temperature for the period 1889–1923 and P E and T E values for each year from 1889–1923 are given for Tucumán. *Subject Headings:* **1. Climatic influences 2. Vegetation 3. Soils 4. Thornthwaite's classification 5. Tucumán, Argentina.**—*I. L. D.*

**3C–161** 551.513:551.521.1

Díaz, Emilio Luis, **Algunas investigaciones sobre circulación atmosférica.** [Some investigations on atmospheric circulation.] *GAEA, Sociedad Argentina de Estudios Geográficos, Anales,*

7(2):213–217, **1945.** 2 figs. **DLC**—In this discussion of the influence of variations in solar activity on atmospheric circulation and meteorological variables, the author develops the following topics: 1) action of solar radiation in the atmosphere, 2) effects of solar radiation on atmospheric pressure in Argentina, 3) effect of sunspot, centrally located, on pressure (illustrated by a chart) and 4) invasions of polar air. *Subject Headings:* **1. Atmospheric circulation 2. Solar radiation 3. Argentina.**

**3C–162** 551.509.33:551.577

Díaz, Emilio Luis, **Un periodograma de las lluvias en Córdoba.** [A periodogram of rainfall in Córdoba.] *Sociedad Científica Argentina, Anales,* 104(5):286–292, Nov. **1942.** 3 figs., table, equations. **DLC**—A periodogram analysis of 50 years (1888–1940) rainfall data for Córdoba—chosen as representative of central Argentina. The author believes the record is too short to be of any use in forecasting. *Subject Headings:* **1. Periodogram analysis 2. Rainfall 3. Córdoba, Argentina.**

**3C–163** 551.513

Díaz, Emilio Luis, **Previsión de la circulación atmosférica.** [Forecasting of atmospheric circulation.] *Sociedad Científica Argentina, Anales,* 144(3):297–364, Sept. **1947.** 26 figs., 5 tables, equations. English summary p. 297–364. **DLC**—This work, which is a continuation of one which appeared in June, 1944 in the same publication with the title "Some investigations on atmospheric circulation" (*see item* 3C–161 above), has as its objective the forecasting, six to eight days in advance, of atmospheric circulation at the surface. For this purpose, the study has been divided into 5 parts: normal atmospheric circulation in the area under consideration, the maximum latitudinal barometric gradient in Patagonia, the minimum of these gradients, a synoptic analysis for selected dates and the effect of solar radiation maximum in the baric field. The earlier work by the same author is based principally on the study of correlations between the march of solar radiation and pressure, on the phenomena which precede invasions of polar air and on the development of independent thermal depressions in Argentina. *Subject Headings:* **1. General circulation forecasting 2. Argentina.**—*C.Ñ.M.*

**3C–164** 551.509.33:551.577

Díaz, Emilio Luis, **Sobre la previsión de periodos secos y lluviosos.** [On the forecasting of dry and rainy periods.] *Sociedad Científica Argentina, Anales,* 135(3):133–143, March **1943.** 4 figs., table, equations. **DLC**—Using the 1860–1930 record of precipitation at Buenos Aires and Bahía Blanca, the author successfully forecast precipitation in the province of Buenos Aires for the period 1931–1939; using the 1885–1935 record for Tucumán and Córdoba he was less successful in forecasting precipitation in northern Argentina for 1936–1939. *Subject Headings:* **1. Precipitation forecasting 2. Buenos Aires Province, Argentina 3. Northwest Argentina.**—*From author's abstract.*

**3C–165** 551.509.3:629.13(02)

Díaz, Emilio Luis and Moragues, Miguel, **Manual de meteorología.** [Manual of meteorology.] Buenos Aires, Servicio de Imprenta, **1944.** 229 p. 84 figs., 14 tables, equations, appends. **DWB**—This text contains chapters which, from the point of view of the synoptic forecaster, go into detail on various practical aspects of atmospheric structure and composition, vertical motions, meteorological elements, general circulation, air masses and fronts, cyclonic storms, clouds, fog, forecasting, map analysis, statistics in meteorology and, finally, a chapter on icing of aircraft. The appendixes contain codes, tables, nomograms, forecasting rules-of-thumb in tabular form for various places in the Argentine, and a subject index. Many schematic diagrams and actual examples of charts for Argentina for specific types are included. (*Same abstract* as No. 2.6–24 in June 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Synoptic meteorology 2. Aeronautical meteorology 3. Textbooks 4. Argentina. I. Argentina. Ministerio de Marina. Escuela de Aviación Naval.**—*M.R.*

**3C–166** 551.586:634

Dimitri, Milán Jorge, **Razones climáticas de la distribución geográfica del mandarino en la República Argentina.** [Climatic reasons for the geographic distribution of mandarin oranges in the Argentine Republic.] *Argentina. Dirección de Propaganda y Publicaciones, Publicación Miscelanéa* No. 109, **1941,** 8 p. map, tables. **DA**—Considers the geographic distribution of the cultivation of mandarin oranges and the effect of temperature and quantity of water on their growth. Suggests other areas where this fruit may be grown. A map shows the geographic distribution of orange cultivation for 1937. Temperature and precipitation data for Concordia is included. *Subject Headings:* **1. Agricultural meteorology 2. Citrus fruits 3. Argentina.**

**3C–167** 551.5(09)

Dora Silva, E., **El régimen del tiempo.** [The weather regime.] *Mendoza, Argentina. Universidad Nacional de Cuyo, Boletín de Estudios Geográficos,* 1(1):23–33, **1948.** **DLC**—A fairly lengthy

discussion of the history of the advances in meteorology and observational methods in various countries, but with particular reference to South America. Considerable detail is provided on trajectories of cyclones and anticyclones, air masses, winds and weather forecasting in Argentina. The writer expresses the need for an ample network of surface and upper-air observation stations, not only in Argentina but also in adjacent countries and the Antarctic. (*Same abstract* as 5–8 in May 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. History of meteorology 2. Argentina 3. South America.**—*M.R.*

**3C–168** 551.582(82):551.311.3

***†La erosión eólica en la región Pampeana y plan para la conservación de los suelos.** [Wind erosion in the Pampa region and a plan for soil conservation.] *Argentina. Instituto de Suelos y Agrotecnía, Publicación Miscélanea* No. 303, **1948.** 170 p. numerous charts and plates, biblio. p. 165–170. **DWB**—In Ch. I. (p. 13–24), a general description of the region under discussion, the location, climate and hydrography are among the subjects treated. Ch. IV (p. 69–80) takes up in some detail the following topics: precipitation, thermal regime, frost, winds, relative humidity, vapor pressure, cloudiness, atmospheric pressure, climatic classification and ecological conditions and eolian erosion. The data is from 12 stations in the area. Tables show: 1) seasonal and annual precipitation (1913–1937); 2) mean, maximum and minimum temperature and frost frequency (1928–1937); 3) relative frequency of wind direction and force (1928–1937); and 4) altitude and annual averages of atmospheric pressure, vapor pressure, humidity and cloudiness (1928–1937). An isohyetal chart and chart of climatic classification are included. The bibliography is classified. *Subject Headings:* **1. Climatology 2. Observational data 3. Wind erosion 4. Soil conservation 5. Pampa Region, Argentina.**

**3C–169** 551.582(82)

Fàntoli, Amilcare, **I caratteri generali del clima dell'Argentina.** [General character of the climate of Argentina.] *Rivista di Agricoltura Subtropicale e Tropicale*, Florence, 42(4/6):116–128, April/June, **1948.** figs., charts, table, refs. Italian and English summaries p. 127. **DA**—The following distinct regions with their sub-regions are described: 1) the Cordillera of the Andes, 2) the Chaco, 3) Misiones, 4) the Pampa, 5) Patagonia and 6) Tierra del Fuego. A careful survey is made of the climate of each region taking into consideration soil conditions, pressure, wind, cloudiness, sunlight, humidity and correlations between temperature and humidity. A chart shows the six natural divisions of the country, climatic classification of each region and a typical station for each region with average temperature and precipitation. Also included are isothermal and isohyetal charts for Jan. and July, annual wind roses for 10 stations and different climatic regions, histograms for rainfall for 1901–1930 and climagrams for 12 stations. *Subject Headings:* **1. Climatology 2. Climatic regions 3. Argentina.**—*From author's abstract.*

**3C–170** 551.582(82,264)

*France. Service Hydrographique de la Marine, **Instructions nautiques, No. 389. Amérique du Sud. Partie Sud.** [Nautical instructions, No. 389. South America. Southern part.] Paris, **1937.** 463 p. 58 figs., 2 fold. maps, tables. **DCGS**—Descriptive and tabular material (p. 2–23) on temperature, barometric pressure, wind, humidity, cloudiness, visibility (fog), precipitation (rain, snow and hail), thunderstorms, mirages, aurora australis and magnetic disturbances for southern South America from Cape San Antonio to Beagle Channel, including the Falkland Islands, South Georgia, the South Orkneys and Graham Land. *Subject Headings:* **1. Climatology 2. Argentina 3. South Atlantic.**

**3C–171** 551.582(82):551.585(82)

†*Galmarini, Alfredo G., Di Corleto, C., Knoche, Walter, Maurstad, Alf, Wölcken, Kurt and Borzacov, V., **Clima de la República Argentina.** [Climate of the Argentine Republic.] (In: GAEA, Sociedad Argentina de Estudios Geográficos, **Geografía de la República Argentina.** Buenos Aires, Coni, **1946–1947.** Vol. 5 and 6. illus., refs.) **DLC**—Treatise which emphasizes the general circulation on the South American continent, with special attention to the problem of the march of weather in Argentina and the elements which determine the climate. Vol. 6 treats of precipitation and the study of regional climates. The climatic classifications of KÖPPEN and KNOCHE have been applied. *Subject Headings:* **1. Climatology 2. Climatic classification 3. Precipitation 4. Argentina.**—*C.Ñ.M.*

**3C–172** 551.506.3:551.577.2(82)

*Geise, Josef, **Die Niederschlagsverhältnisse Argentiniens.** [Argentine precipitation conditions.] Inaug.-Diss.—Wilhelms-Universität zu Münster. Münster, Heinrich Pöppinghaus. **1934.** 36 p. 6 charts, graph, 8 tables, 26 refs. **MH-BH**—This study deals with the following topics: regional and periodic (monthly and seasonal) distribution of precipitation, reasons for local and

periodic distribution, number and distribution of rain days, precipitation density, amount of rain in a single fall, dry and rainy periods, precipitation variation and precipitation in solid forms. Among the charts is one for days with thunderstorms and one for days with hail in a year. A table presents monthly and annual precipitation data for 108 stations. Coordinates for each station and its location as to province is given. *Subject Headings:* **1. Precipitation distribution 2. Precipitation data 3. Argentina.**

**3C–173** 551.510.5:551.515.8:551.506.7(81)

Georgii, Walter, **Beitrag zur Aerologie Argentiniens.** [Study of Argentine aerology.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 27, **1951.** 18 p. 18 figs., 18 tables. **MH-BH, DWB**—Aerological observations by means of aircraft flights were carried out over Buenos Aires and Córdoba up to elevations of 5 and 7 km respectively. The mean condition of the atmosphere during summer and winter was determined and the air masses were analyzed on the basis of representative equivalent potential temperatures. The following topics are discussed: vertical stratification of the atmosphere, pseudo-inversions and pseudo-temperature gradients, the Argentine air masses during the summer, the upper convective region above central and northern Argentina, the pampero front and the mean condition of the atmosphere above Córdoba during winter and winter air masses. *Subject Headings:* **1. Atmospheric structure 2. Air masses 3. Upper air temperatures 4. Córdoba, Argentina 5. Argentina.**—*I.L.D.*

**3C–174** 551.509.67

Georgii, Walter, **Teoría de cambio de fases del agua y su aplicación en el problema de la lluvia artificial.** [Theory ot the change of properties of water and its application to the problem of artificial precipitation.] *Sociedad Científica Argentina, Anales*, 148(6):343–364, Dec. **1949. DLC**—An exposition of new ideas about the principal theories which govern the change of properties of water according to the works of VOLLMER and the experimental research carried on in Germany, especially on the activity of freezing nuclei. The author examines the basic requirements for the formation of precipitation and their possible application in Argentina making use of the formation of stationary cumulus characteristic of the sierras of Córdoba and San Luis and in the Cordillera of the Andes. *Subject Headings:* **1. Artificial precipitation 2. Argentina.**—*C.Ñ.M.*

**3C–175** 551.582(82) 91(82)

Gómez Omil, Dolores; Santamarina, Estela B. de and Rohmeder, Guillermo, **Tres contribuciones a la climato-geografía de Tucumán.** [Three contributions to the climato-geography of Tucumán.] *Tucumán, Argentina. Universidad Nacional, Instituto de Estudios Geográficos, Monographia 9*, [**1947**]. 43 p. 2 figs., charts, tables, 6 refs. **DWB**—The first article, by GÓMEZ OMIL, deals with rainfall patterns in the flat region of Tucumán. The difference between rainfall in summer and that in autumn and winter is pointed out. Daily rainfall observations for 1942 and 1943 are used for the study and graphs show the distribution on selected days. SANTAMARINA and ROHMEDER, authors of the second article, discuss the "Native vegetation as an indication of surface climate." By using meteorological, plant ecological and edaphic observations they distinguish six surface climates in the valley of Tafí. A map shows each of these climatic regions and a table gives the climatic character of each. The third article, written by ROHMEDER, deals with meteorological observations in the high region of the nevados of the Anconquija and is treated in greater detail elsewhere (*see item* 3C–224 below). *Subject Headings:* **1. Climatology 2. Precipitation 3. Climatic regions 4. Geography 5. Tucumán, Argentina.**

**3C–176** 551.582:551.577.38(82)

Guiñazú, José Román, **El problema de la sequía en San Luis.** [The problem of drought in San Luis.] *Revista Geográfica Americana*, Buenos Aires, 5(58):1–28, July **1938.** figs., maps, photos (2 in color), refs. **DA**—The author treats first the climatic conditions in Argentina—air masses, humidity, wind and evaporation. He next deals with the causes and effects of the drought in San Luis in 1937. He suggests the formation of a technical commission under the direction of the Minister of Agriculture to study the water problem, forest problem and the problem of soil conservation. The article concludes with reference to the work being done in Brazil to conserve forests and suggests similar projects for various provinces of Argentina. A phytogeographic chart and one showing humidity areas are included. *Subject Headings:* **1. Climatology 2. Drought 3. Forestry 4. San Luis Province, Argentina.**

**3C–177** 551.582(82)

Hann, Julius, **Zum Klima der Anden von Argentinien.** [On the climates of the Andes of Argentina.] *Meteorologische Zeitschrift*, 16(2):83–85, Feb. **1899. DWB**—Table shows monthly and annual average for a 3-year period (1886–1889) for temperature, cloudiness, precipitation and wind force and direction for Uspallata. *Subject Headings:* **1. Mountain meteorology 2. Uspallata, Argentina.**

3C–178 551.555.4 551.515.8(82)

Hennessy, J., **Pampero off the Argentine coast.** *Marine Observer*, 2(15):42, March **1925. DWB**—The pampero, the local name given to a heavy line squall which may be encountered on the cold front of a depression moving seaward over the Argentine coast, is most frequent during the southern winter. This occurrence of a pampero was observed from the *S.S. Royal Transport* on March 3, 1924. The situation producing the storm and its characteristics are noted. *Subject Headings:* **1. Pamperos 2. Line squalls 3. Argentina.**

3C–179 551.509.33

Hessling, N. A., **Correlación entre las temperaturas de las Orcadas y las lluvias en la República Argentina.** [Correlation between the temperatures of the Orkneys and the rains of the Argentine Republic.] *Argentina. Oficina Meteorológica Nacional, Boletín Mensual*, 1(11):36–40, **1916.** 2 figs., 2 tables. **DWB**—Translation in *Symons' Meteorological Magazine*, 52:73–75, **1917. DLC**—Author found high negative correlations (only 10–14 cases) between temperature in South Orkneys April–Nov. and rainfall of Argentina $2\frac{1}{2}$–4 years later. The relation acts through Antarctic ice. Some similar relations were found in North Atlantic but on scanty data. (*Same abstract* as 2B–16 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Correlations 3. Argentina.**—*C.E.P.B.*

3C–180 551.509.33:551.515(82)

Hessling, N. A., **Variable features of barometric depressions and anticyclones as a basis for seasonal forecasting.** *Monthly Weather Review*, 55:184–186, **1927.** 3 tables. **MH-BH**—Seasonal forecasts in Argentina are based on tendency of certain types of pressure distribution to occur frequently in some seasons, and on relation between mean latitude and tracts of depressions and anticyclones and rainfall in following season at Buenos Aires. High correlation (.67 to .84) found. (*Same abstract* as 2B–65 in Feb. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Long range forecasting 2. Anticyclones 3. Depressions 4. Argentina.**—*C.E.P.B.*

3C–181 551.578.72(82)

*Hoxmark, Guillermo, **Granizo en la República Argentina.** [Hail in the Argentine Republic.] Buenos Aires, *Talleres Gráficos del Ministerio de Agricultura de la Nación*, **1927.** 35 p. 29 figs., 4 tables, ref. **DWB**—Article deals with hail formation, hail classification, protection against hailstorms, hail frequency and destructive hailstorms in 1926. Tables, chart and graphs show average monthly and annual hailstorm frequency for 17 stations (shown on location chart). Data collected for periods varying from 11 to 20 years. Other charts show average annual and monthly frequency for 1926. (*Same abstract* as D–148 in April 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Hail distribution 2. Argentina. I. Argentina. Dirección de Meteorología.**

3C–182 551.509.33:523.72

Hoxmark, Guillermo, **Solar radiation and the weekly weather forecast of the Argentine Meteorological Service.** *Smithsonian Miscellaneous Collections*, 77(7), **1925.** 23 p. 5 figs., 20 tables. Introductory note by CHARLES GREELEY ABBOT. **DSI**—Weekly forecasts of temperature were based on solar radiation, solar faculae, terrestrial magnetism, atmospheric electricity and past weather. Forecasts for each day were correlated with observed temperatures and occurrences of rainfall; about three-quarters of the correlations were positive. (*Same abstract* as 2A–50 in Jan. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Solar radiation 2. Solar faculae 3. Extended forecasting 4. Argentina. I. Abbot, Charles Greeley.**—*C.E.P.B.*

3C–183 551.577.2(82):581.9

Hueck, K., **Die Südgrenze des "Tucumanisch-Bolivianischen Waldgebietes" in nordwest-Argentinien.** [The southern boundary of the "Tucumán-Bolivian forest region" in northwest Argentina.] *Erdkunde*, Bonn, 5(4):305–310, Oct. **1951.** 7 figs., 6 refs. **DLC**—The three forest regions of Argentine (NW, NE and SW) are compared with rainfall chart. The forestry of the NW (Tucumán) region is then described in greater detail showing height zones. *Subject Headings:* **1. Forest limits 2. Rainfall distribution 3. Argentina.**—*C.E.P.B.*

3C–184 551.510.42

Izzo, Roque A., Marenzi, Agustín D. and Chiodi, Hugo, **El número de partículas en la atmósfera de la ciudad de Buenos Aires.** [The number of particles in the atmosphere of the city of Buenos Aires.] *Semana Medica*, Buenos Aires, 46, Pt. 2:1117–1123, Nov. 16, **1939.** 6 figs., table, refs. **DSG**—The various methods of investigation and the types of apparatus are described. For the investigation, the city was divided into 13 zones. The table gives place of observation, zone, date, weather conditions and particles per liter of air for a number of places on selected days in April, May and July 1939. Buenos Aires shows less atmospheric pollution than Berlin and Leipzig because

of wide streets and low buildings. *Subject Headings:* **1. Atmospheric pollution 2. Urban air 3. Buenos Aires, Argentina.**

**3C–185** 551.582:551.588(82)

Jagsich, Juan, **Influencia oceánica en nuestro clima.** [Oceanic influences in our climate.] *Revista Meteorológica*, Montevideo, 5(20):214–245, Oct. **1946.** 5 figs., 16 charts. . . . **Pt. II.** *Ibid.*, 6(21):25–66, Jan. **1947.** 39 charts, 23 refs. **DWB**—General descriptive analysis of the climatic characteristics of Argentina with a study of the influence of oceanic winds on meteorological elements. *Subject Headings:* **1. Climatology 2. Oceanic influences 3. Argentina.**—*C.Ñ.M.*

**3C–186** 551.509.34:551.524.37:63

Jagsich, Juan, **La previsión de las heladas. Métodos sencillos y prácticos, para uso de agricultores, vinateros, horticultores y floricultores.** [Frost forecasting. Simple methods and practices to be used by the farmer, vine grower, orchardist and florist.] *Revista Meteorológica*, Montevideo, 10(36–37):49–60, Jan.–April **1951.** 6 figs. **MH-BH**—Describes simple and practical methods to be used by persons engaged in various types of agriculture. Following a discussion of various factors that determine intensity of frost: temperature, wind, humidity, etc., the author outlines three methods for forecasting frost. Data for some of the graphs was obtained at Córdoba. *Subject Headings:* **1. Frost forecasting 2. Agricultural meteorology 3. Argentina.**

**3C–187** 551.555.3

Jagsich, Juan, **El viento Zonda. Su derarrollo** (*sic*), **sus variantes y características.** [The zonda winds. Its development, variations and characteristics.] *Revista Meteorológica*, Montevideo, 3(10):114–129, March **1944.** figs., chart, 15 refs. **DWB**—The zonda, a warm, dry wind, occurs in the northwest of Argentina and is named for a valley. . The analysis of the wind presented here deals with the classic form, variations and physical characteristics of the zonda. An example of a zonda of exceptional violence on August 12, 1941 is included. This type of wind occurs throughout the Cordillera of the Andes from Catamarca to Tierra del Fuego and is similar to the föhn of the Alps and the chinook in the United States. Cross sections are presented to show a typical development of the zonda. *Subject Headings:* **1. Zonda 2. Argentina.**

**3C–188** 551.579 551.583(82)

Keidel, Juan, **Clima, desagüe y aguas subterraneas en la Argentina.** [Climate, drainage and subterranean waters in Argentina.] *Tucumán, Argentina. Universidad Nacional, Instituto de Estudios Geográficos, Monografiá* No. 10, [**1948**]. 74 p. 9 figs., 6 plates. Translated by Guillermo Rohmeder and María Antonía Reynaud. **DWB**—A work especially descriptive of hydrometeorology in which is given first a sketch of South American hydrography, then an analysis of the phenomenon of infiltration and evaporation in relation to climate and its changes and, finally, a study of the formation of arid zones in Argentina in relation to meteorological factors. *Subject Headings:* **1. Hydrometeorology 2. Climatic changes 3. Aridity 4. Argentina. I. Rohmeder, Guillermo** (*trans.*) **II. Reynaud, María Antonía.** (*trans.*)—*C.Ñ.M.*

**3C–189** 551.594

Knoche, Walter, **Forma fuera común de descargas eléctricas observadas in las Sierras de Córdoba durante una lejona tempestad eléctrica.** [Unusual form of electrical discharges in the Córdoba Hills during a distant electrical storm.] *Revista Meteorológica*, Montevideo, 6(22):124–127, April **1947.** **DWB**– Description of silent discharges of strong luminous intensity followed by one of a white color, very intense and almost circular first observed at 8 p.m. on Feb. 25, 1941 in a southerly direction from a point in the Alta Sierra of Córdoba. Discharges continued until the early morning of Feb. 26, appearing at irregular intervals of from 5 to 15 minutes and assuming various forms. Temperature changes and cloud forms observed some hours before the appearance of the silent discharges and thunder, fog and rainfall observed from 7 to 8 hours afterwards are mentioned. Examination of the weather map revealed that the lightning observed by the author corresponded to a distant electrical storm which covered the southeastern part of the province of Córdoba and extended as far as the south of the province of San Luis. *Subject Headings:* **1. Lightning 2. Sierras de Córdoba, Argentina.**

**3C–190** 551.586:612 551.515.8(82)

Knoche, Walter, **Klimatographische Witterungsschilderung Nr. 112: Argentinien. Bioklimatische Eindrücke während des Sommers in Buenos Aires. Beobachtungszeit: Januar 1938.** [Climatographical weather sketch No. 112: Argentina. Bioclimatic impressions during a summer in Buenos Aires. Period of observation: January 1938.] *Annalen der Hydrographie und Maritimen Meteorologie*, 66(6):316–318, June **1938.** **DLC**—Notes on the effect of presistent summer and autumn sultriness in Argentina on the habits of the people: clothing, air conditioning, etc. Difference

between men's and women's dress (outdoors and in) is noted; effect of occasional interruptions in sultriness due to pamperos, Antarctic or Pacific air masses invading the region; suffering from cold or near-frost at such times was noted. Values of wet bulb and cooling power given as examples. Wind and radiation also factors in comfort as well as type of architecture and streets. *Subject Headings:* **1. Bioclimatology 2. Air masses 3. Argentina.**—*M.R.*

**3C–191** 551.578.7:551.524.35

Knoche, Walter, **Observaciones de un enfriamiento súbito debido a una granizada fina.** [Observations of a sudden fall of temperature following a hailstorm.] *Revista Meteorológica*, Montevideo, 6(22):128–130, April, **1947.** table, refs. **DWB.** Also in: *Sociedad Científica Argentina, Anales*, 134(4):242–244, Oct. **1942. DLC**—Data based on storm at Córdoba on Sept. 20, **1941.** Table gives for every hour of the 24: dry and wet temperature, wind direction and velocity, cloud formation. Comments on meteoropathological significance of sudden cooling of temperature. (*Same abstract* as D–134 in April 1950 *Meteorological Abstracts.*) *Subject Headings:* **1. Hailstorms 2. Córdoba, Argentina.**

**3C–192** 551.585:633.61

Knoche, Walter and Borzacov, V., **Estudio comparativo de climas apropiados para el cultivo de la caña de azucar según una nueva clasificación climatica.** [A comparative study of climates suitable for the cultivation of sugar cane according to a new climatic classification.] *Tucumán, Argentina. Universidad Nacional, Estación Experimental Agrícola, Boletín* No. 30, May **1940.** 19 p. 12 figs., table. **DA**—Applies KNOCHE's scheme of climatic classification to the sugar areas of the world, with particular reference to Argentina (illustrated by diagrams). The table gives the coordinates, altitude and climatic classification of 44 stations throughout the world. *Subject Headings:* **1. Climatic classification 2. Agricultural climatology 3. Argentina.**

**3C–193** 551.583

Knoche, Walter and Borzacov, V., **Indice de variabilidad climática.** [Index of climatic variability.] *Sociedad Científica Argentina, Anales*, 133(4):279–292, April **1942.** tables. **DLC**—Explanation of a decimal system for classifying climatic variability. Climatic variability is obtained by the formula $K = I_h + Ad + Aa$; $K$ = index of climatic variability, $I_h$ = index of desiccation $= \frac{E}{e} = \frac{\text{maximum vapor pressure}}{\text{existing vapor pressure}}$, $Ad$ = daily periodic amplitude of temperature, $Aa$ = annual amplitude of the average monthly temperatures. This system is applied to a number of stations in Argentina and Chile for January, July and for the annual averages for a 20-year period (1901–1920) and for 1934 and 1937. Geographic coordinates and altitudes for these stations are given. Annual decimal value of $K$ for stations in various parts of the world is also tabulated. *Subject Headings:* **1. Climatic variations 2. Climatic classification 3. Argentina 4. Chile.**

**3C–194** 551.583.2:525.3

Köppen, Wladimir, **Das Klima Patagoniens im Tertiär und Quartär.** [Patagonian climate in the Tertiary and Quaternary.] *Beiträge zur Geophysik*, 17(3):391–394, **1927.** fig., table. **DLC**—If climatic changes in North America and Europe are based predominantly on the shifting of the pole, such changes must be nearly the opposite in southern South America. In a book by H. v. IBERING it is shown that from the beginning of the Miocene to the middle of the Quaternary the animal world of the sea on the east coast of Patagonia was tropical, but later the life of the warm sea died out. This theory is illustrated by a map. *Subject Headings:* **1. Climatic changes 2. Geological climates 3. Polar migration 4. Patagonia, Argentina.**—*From author's abstract.*

**3C–195** 551.582(82)

Kühn, Franz, **Argentinien.** [Argentina.] Breslau, Ferdinand Hirt, **1927.** 2 Vols. Vol. I, text; Vol. II, figs., charts. Numerous refs. in Vol. I. **DWB**—Pt. IV of Vol. I (p. 188–205) deals with the climate of Argentina including descriptions of temperature, pressure and wind, rainfall, humidity, cloudiness, sunshine duration and Argentine climatic regions and zones. A table shows the four zones and twelve regions into which the author has divided the country. A list of references is found on p. 204 and 205. Chap. III in the same volume deals with hydrography and Chap. V with plant ecology. *Subject Headings:* **1. Climatology 2. Climatic regions 3. Argentina.**

**3C–196** 551.582(82) 91:82

†Kühn, Franz, **Fundamentos de fisiografía Argentína.** [Principals of Argentine physiography.] With an introduction by CRISTÓBAL M. HICKEN. Buenos Aires, Talleres Gráficos P. Preusche, **1922.** 217 p. 23 charts, 163 photos, table 795 refs. **DWB**—This volume treats in detail the geography of

Argentina. Chapters are devoted to topography, geology, orography, hydrography, climate and phytogeography. In Chap. 6 (p. 162–177), on climate, the following features: temperature, atmospheric pressure, wind, precipitation, humidity, cloudiness, and sunshine are discussed. The climatic regions are distinguished and their rainfall and temperature characteristics are shown in a table. The number of I, II, III and IV class stations in Argentina in 1884, 1904 and 1914 is given. Very little tabular data is included, but the chapter does contain an isothermal chart (annual, Jan. and July), a chart of the annual distribution of the rainfall amount and a chart of climatic regions. J. BARTELS has summarized this chapter in an article entitled "Zur Klimatologie Argentiniens," *Meteorologische Zeitschrift*, 41(12):392–395, 1924. The numerous references will be found at the end of the several chapters. *Subject Headings:* **1. Climatology 2. Geography 3. Argentina. I. Hicken, Cristóbal M.**

**3C–197** 551.582(82)

Kühn, Franz, **Das Klima in den argentinischen Hochkordilleren.** [The climate of the Argentine high Cordillera.] *Petermanns Geographische Mitteilungen*, 59(12):329, Dec. **1913.** 2 tables. **DLC**—Brief remarks on temperature, cloudiness and rainfall observed in Feb. and March 1911. Tables present temperature data for three zones (2700 m, 3300 m and 3700 m mean altitude) and comparisons of average temperature between the three. Brief reference made to two thunderstorms on March 8 and 9, 1911. *Subject Headings:* **1. Mountain meteorology 2. Temperature data 3. Andes 4. Argentina.**

**3C–198** 551.582(82)

*Kühn, Franz Hermann and Rohmeder, Guillermo, **Estudio fisiográfico de las sierras de Tucumán.** [Physio-geographical study of the sierras of Tucumán.] 2nd ed. *Tucumán, Argentina. Universidad Nacional, Instituto de Estudios Geográficos, Monografía* 3. [1943]. 96 p. 4 figs., 5 contour charts, 2 maps, 2 panoramas, 31 plates, tables, biblio. p. 90–96 (85 refs., 115 maps). **DWB**—Climatic conditions in the sierras of Tucumán are considered in Chap. V (p. 50–65). Tables present average annual rainfall for 11 stations (no period of record), monthly and annual temperature for 3 stations (no period of record) and temperature, cloudiness, wind direction and force, and precipitation for a selected day for each of 18 stations. *Subject Headings:* **1. Climatology 2. Observational data 3. Tucumán, Argentina.**

**3C–199** 551.524:635

Ledesma, Néstor René, **Consecuencias del frío invernal insuficiente en los árboles de follaje caduco.** [Effects of insufficient winter cold on deciduous trees.] *Argentina. Servicio Meteorológico Nacional, Ser. Agrometeorológica, Publicación* No. 1, **1950.** 20 p. photos., graphs, 13 refs. Spanish and English summaries p. 19. Appeared originally in *La Revista de la Facultad de Agronomía de La Plata*, Vol. 27. **MH-BH**—A phenological investigation to determine the correlation between the insufficiency of winter cold and the decrease in the yield of deciduous trees. *Subject Headings:* **1. Temperature effects 2. Horticulture 3. Argentina.**—*From author's abstract.*

**3C–200** 551.506.8:635(82)

Ledesma, Néstor René, **La floración del duraznero y su relación con las temperaturas de invierno y de primavera.** [Blooming of the peach tree and its relation to winter and spring temperatures.] *Meteoros*, Buenos Aires, 1(1):73–90, Jan. **1951.** 2 figs., 11 tables, 20 refs. **DWB**—The phenological behavior of 50 varieties of peach trees is studied by examining winter and spring temperatures in 1941–42, 1942–43. It is discovered that spring temperatures have a smaller influence on the beginning and development of flowering than winter temperatures which, if sufficiently cold, significantly retard the time of blooming. The varieties of peach trees are classified according to their requirements of cold, and those having a smaller requirement are recommended for the Buenos Aires area. (*Same abstract* as No. 2.10 26 in Oct. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Phenology 2. Horticulture 3. Argentina.**—*R.S.Q.*

**3C–201** 551.506.3 551.582.2(82) 551.524

*Lillo, Miguel, **Cuarenta años de observaciones pluviométricas y termométricas en la ciudad de Tucumán (1883–1924).** [Forty years of rainfall and temperature observations in the city of Tucumán (1883–1924).] Buenos Aires, Imprenta y Casa Editora "Coni," **1924.** 31 p. diagrs., tables. **NNA, DWB**—Tables present monthly and total rainfall, numbers of days with rain and maximum rainfall in 24 hours and monthly and annual mean, maximum, minimum and extreme temperatures. The data are also shown graphically. *Subject Headings:* **1. Precipitation data 2. Temperature data 3. Long period records 4. Tucumán, Argentina. I. Tucumán, Argentina. Universidad Nacional. Museo de Ciencias Naturales.**

3C–202 551.577.3:551.588.2

Marchetti, Adolfo A., **Oscilaciones extremas de la cantidad de precipitación en la República Argentina.** [Extreme variations of the amount of precipitation in the Argentine Republic.] *Meteoros*, Buenos Aires, 1(1):46–54, Jan. **1951.** 3 tables, 2 refs. **DWB**—The relationship $Q = M/m$, first used by ANGOT, in which $M$ and $m$ are the maximum and minimum precipitation amounts, respectively, is considered by the author to be the most satisfactory index of the annual variability of precipitation. $Q$ is computed for 58 stations from a 46-year period of record and the values used to present a map of Argentina with $Q$ isolines. The highest station value is 24.4 at San Juan. In general, the highest values, ranging from 4 to 24.4, are found in western and southern Argentina, where mountain and other influences contribute to the high variability indexes. (*Same abstract* as No. 2.9–134 in Sept. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Precipitation variations 2. Orographic effects 3. Argentina.**—*R.S.Q.*

3C–203 551.5(05)

**Meteoros. Revista Trimestral de Meteorología y Geofísica del Servicio Meteorológico Nacional, Buenos Aires.** [Meteoros. Quarterly Review of Meteorology and Geophysics of the National Meteorological Service, Buenos Aires.] First issue received: Vol. 1, No. 1, Jan. **1951**; latest issue: Vol. 1, No. 2 3, June **1951.** Issued by the Servicio Meteorológico Nacional. Paseo Colon 317, Buenos Aires, Argentina. Editor: DR. MARTIN S. CAPPELLETTI. Price: 4 pesos m/n. figs., graphs, tables. English summaries. **DWB**—"Meteoros" is a new, scientific quarterly journal devoted to the publication of the geophysical and meteorological researches of the Argentine National Meteorological Service. It aims to present material on the theoretical and technical aspects of meteorology, geomagnetism, atmospheric electricity, etc. In addition to regular articles, the journal contains brief notes, a chronology of scientific activities in meteorology and fields relating to it in Argentina and in Latin America as a whole, and book reviews. *Subject Headings:* **1. Meteorology 2. Periodicals. I. Argentina. Servicio Meteorológico Nacional.**—*I.L.D.*

3C–204 551.506.8:635(82)

Muguerza, Alberto, **Observaciones fenológicas sobre especies y variedades de frutales cultivadas en la zona de 25 de Mayo (Provincia de Buenos Aires).** [Phenological observations of species and varieties of fruit trees cultivated in the region of 25 de Mayo (Buenos Aires province).] *La Plata, Argentina. Universidad Nacional, Facultad de Agronomía, Revista*, 23:167–276, **1938.** 15 figs., 6 plates, tables, biblio. p. 272–275. English and German summaries p. 275–276. **DA**—This work emphasizes the economic importance of fruit growing in Argentina and the necessity for studies in regional phenology and genetics of pomology. Data for a 9-year period of the grafting, flowering, pollination and ripening of a number of different kinds of fruit trees are shown in graphs and tables. As a result of this study, it is possible to determine how to improve the unproductive varieties of fruit. Attention is also given to methods of protection from frost damage and to the determination of the best distances between trees when planting. *Subject Headings:* **1. Phenology 2. Horticulture 3. 25 de Mayo, Argentina.**

3C–205 551.582(82)

Napp, Richard, **The Argentine Republic, written for the Central Argentine Commission on the Centenary Exhibition at Philadelphia.** Buenos Aires, Sociedad Anónima, **1876,** 463+p. fold. maps, tables. **DWB**—A brief description and some tabular material for 1874 for Salta, Tucumán, Corrientes, Pilciao, Córdoba, Buenos Aires and Bahia Blanca is contained in p. 33–38. *Subject Headings:* **1. Climatology 2. Argentina.**

3C–206 551.577.2(82)

Olascoaga, M. J., **Some aspects of Argentine rainfall.** *Tellus*, 2(4):312–318, Nov. **1950.** 11 figs., 4 tables, 3 refs., append. **MH-BH**—A study to determine the percentage of days with rain which accounts for most of the rainfall in different climatic provinces of Argentina and the percentage of rainfall which results from rainstorms (when more than 5 stations in a zone record rainfall on a given day). Ten nearly uniform rain gage stations in 9 provinces and 5 rain gage stations in the far south were chosen for this study of a 5-year period, 1944–1948. Tables show: 1) mean seasonal and annual rainfall in each zone, 2) mean seasonal and annual number of days with rain for the same areas, 3) percentages of days with rain that account for 50% and 75% of the annual precipitation in each zone and 4) the percentages of rainstorms that account for 50% and 75% of the annual precipitation due to rainstorms in each zone. (*Same abstract* as No. 2.10–139 in Oct. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Precipitation distribution 2. Argentina.**

3C–207 551.586:63

Papadakis, Juan, **Mapa ecológico de la República Argentina.** [Ecological chart of the Argentine Republic.] Argentina. Ministerio de Agricultura y Ganadería, **1951.** 2 Vol. Vol. 1,

text; Vol. 2, atlas. **DWB**—This work includes an ecological classification of climate, a detailed treatment of the climate and explanations of the ecological charts for various agricultural products. The system of climatic classification is based on thermal conditions of winter and summer, seasonal regime of humidity and saturation deficit. A chart (Vol. II) shows the country divided into 33 climatic regions subdivided into 84 types. Regions and types are agro-climatic units characterized by the homogeneity of its agricultural climate. For the detailed survey of Argentina's climate the country is divided into six geographic areas and the author s ecological classification is applied to each. Ecological charts (Vol. II) for wheat, flax, corn, sunflowers, peanuts, alfalfa, other forage crops, vegetables, grapes, olives and various fruits illustrate the explanatory text. Additional charts, tables and "climodiagrams" complete the work. *Subject Headings:* **1. Agricultural climatology 2. Plant ecology 3. Climatic regions 4. Argentina.**

**3C–208** 551.582(82)

Pérez, Martín, **Balde, Provincia de San Luis, una instalación humana en la región árida Argentina.** [Balde, Province of San Luis, an inhabited area in the arid region of Argentina.] *Mendoza, Argentina. Universidad Nacional de Cuyo, Boletín de Estudios Geográficos*, 1(3):11–40, **1949.** chart, graphs, photos, tables. **DLC**—In his study of the natural conditions of the region, the author surveys the soil components, climate, surface water and vegetation. Temperature, wind and precipitation are the features of climate which are described at some length (p. 15–17). He mentions the abrupt changes in temperature—from 40°C in the daytime to 18°C at night—caused by the rapid advance of cold air from the south. This phenomena is known as a "chorrillero." A table contains monthly and annual rainfall for a 20-year (*sic*) period (1928–1948). The driving of artesian wells has made the area habitable. *Subject Headings:* **1. Climatology 2. Balde, Argentina.**

**3C–209** 551.501.42 551.577

Pérez-Moreau, Román A., **Una variante al gráfico o diagrama hidrotérmico de Raunkiaer.** [A variation of Raunkiaer's hydrothermic graph or diagram.] *Buenos Aires. Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Instituto Nacional de Investigación de las Ciencias Naturales, Revista, Ciencias Botánicas*, 1(1), **1948.** 28 p. numerous graphs (1 fold.), map, 2 tables, refs. Spanish, French, English and German summaries p. 10–12. **NNA, DLC**—Using Knoche's concepts of "active temperature" and effective precipitation," a variation of Raunkiaer's hydrothermic graph or diagram is offered. The author would substitute the curves of monthly mean observed temperature (T) and monthly mean observed rainfall (P), with those of the monthly mean "active temperature" (Ta) and monthly mean "effective precipitation" (Pe). Graphs of monthly mean observed temperature and rainfall and active temperature and effective precipitation for 44 stations, arranged in botanical provinces (according to Castellanos and Pérez-Moreau) are presented. Geographic coordinates and altitude are given for each station. Included are a station location map and nomogram for the reduction of observed precipitation to effective precipitation. *Subject Headings:* **1. Nomograms 2. Precipitation calculation 3. Temperature calculation 4. Argentina.**—*From author's abstract.*

**3C–210** 551.5:06:92(09)

†Pitchford, Leslie Lee, Jr., **Benjamin Apthorp Gould and the development of the Argentine Meteorological Service.** Thesis (M.A.) George Washington University, **1950.** 112 p. map, photo, tables, biblio. p. 105–112, appends. Typescript. **DWB**—Chaps. I and II deal with the early life of Gould and his work in the United States. Chaps. III and IV cover the 13 years Gould lived in Argentina. The first of these treats of his activities in connection with the astronomical observatory he established at Córdoba for the purpose of taking observations of the southern sky. This observatory, the first of its kind in Argentina and the second in South America, was dedicated in Oct. 1871. The problems he had to solve and his accomplishments in the field of astronomy are considered. The next chapter reviews Gould's part in the establishment of the Argentine Meteorological Service in 1872 and his work as its first director. This chapter includes: 1) essential parts of the law establishing the service, 2) the work of several men who made observations without instruments in Mendoza between 1830 and 1849, 3) tables showing the stations reporting for each year from 1873–1884, 4) the names of various volunteer observers prior to the establishment of the Servicio Meteorológico and 5) a year by year summary of the Service under the directorship of Dr. Gould (1873–1884). Chap. V treats of Dr. Gould's activities from the time he returned to the United States until his death in 1896. *Subject Headings:* **1. Gould, Benjamin Apthorp 2. Meteorological services 3. History of meteorology 4. Biography 5. Argentina.**

**3C–211** 551.515.8:551.553(82)

Prohaska, Federico J., **Rosa climática de los vientos fuertes en Buenos Aires.** [Climatic rose of strong winds in Buenos Aires.] *Meteoros*, Buenos Aires, 1(2–3):160–171, June **1951.** 4 figs., 3 tables. Spanish and English summaries p. 160. **DWB**—The character of winds from different

quadrants and the diurnal variation in winds and in the meteorological elements at Buenos Aires are treated in detail. Graphic representation (wind roses) of the frequency of winds from various octants, and temperature, vapor pressure and relative humidity wind roses show the influence of land and sea distribution in the vicinity. The properties of air masses coming from the several points of the compass, the diurnal and seasonal variations in the above elements and in cloud amount are shown in tables, discussed and explained. *Subject Headings:* **1. Air mass characteristics 2. Climatic wind roses 3. Buenos Aires, Argentina.**—*M.R.*

**3C-212** 551.506.3:551.311.181(264)

*Prohaska, Federico J., **Sobre el estado de los hielos en la Bahía Escocia. (Islas Orcadas del Sud).** [On the state of ice in Scotch Bay. (South Orkney Islands).] *Meteoros*, Buenos Aires, 1(2-3):216-218, June **1951.** 4 tables. **DWB**—Forty eight years (1903-1950) of observation at Scotch Bay form the basis of this study. The average date for the closing of the bay is May 28 and the average date for opening is Dec. 12. Tables show the beginning and ending of the ice, the number of days on which the bay is closed and for each year the date of first ice seen, date of closing of bay, date of opening of bay and date of last ice seen. *Subject Headings:* **1. Sea ice formation 2. Long period records 3. Scotch Bay, South Orkney Islands.**

**3C-213** 551.583.14

Prohaska, Federico J., **Zur Frage der Klimaänderung in der Polarzone des Südatlantiks.** [On the question of the change of climate in the polar zone of the South Atlantic.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 2(3):72-81, **1951.** 2 figs., 2 tables. German, Spanish, English and French summaries p. 72-73. **MH-BH**—Air and sea temperature, air pressure and (reversed) ice cover and precipitation in South Orkneys 1903-1950 all show a parallel oscillation (maximum ca. 1920, minimum 1930, maximum 1940) which is indicated also by other stations in Southern Hemisphere. There was no progressive rise of temperature. *Subject Headings:* **1. Climatic variations 2. South Orkneys Islands 3. Southern Hemisphere.**—*C.E.P.B.*

**3C-214** 551.509.33

**Pronosticos meteorológicos a largo plazo. Informes de la Comisión Oficial designada por el Ministerio de Agricultura de la Nación.** [Long range forecasts. Report of the Commission appointed by the Ministry of Agriculture.] *Argentina. Dirección de Meteorologia, Geofisica e Hidrologia, Ser. E, Publicación* 1, **1934.** 62 p. **DLC**—After chapters on forecasting in general and short range forecasts, Chap. 3 of the majority report discusses the various methods of long range forecasting, their results and the public reactions to them. Chap. 4 examines the possibility of official long range forecasts in Argentina. In Chap. 5 it is concluded that such forecasts are not practicable. J. JAGSICH presented a minority report recommending further investigations. (*Same abstract* as No. 2A-12 in Jan. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Weather forecasting 2. Argentina.**—*C.E.P.B.*

**3C-215** 551.524.37:633.491

Ratera, Enrique L., **Resistencia a las heladas de algunos Solanum (Tuberarium) Argentinos.** [Resistance to frost of some varieties of Solanum (Turberarium) Argentinos.] *Sociedad Científica Argentina, Anales*, 143(6):258-263, June **1947.** table, refs. **DLC**—Lists 19 species and varieties of potatoes which other investigators had found to have a high resistance to frost. To determine the resistance of nine Argentine species of wild potatoes which are cultivated in the open country, a study was conducted at an experimental station at Villa Ortúzar during 1941 1945. The coordinates, altitude and summary of climatic data is given for the station. A table lists the species and extent of damage for selected dates in June and July, 1945. Summarizes the extent of damage to buds, flowers, leaves, stems and the entire plant of the various species at specific temperatures. *Subject Headings:* **1. Frost 2. Plant resistance 3. Potatoes 4. Argentina.**

**3C-216** 551.501.9:06

**Red de observatorios y estaciones meteorológicas.** [Network of observatories and meteorological stations.] *Argentina. Servicio Meteorológico Nacional, Ser. E, Publicación* No. 4, ed. No. 6, **1946.** unpaged. table. **DWB**—Lists the 251 stations in operation on Dec. 31, 1946 with their coordinates, altitude, location in province or territory and their classification as to order and type. *Subject Headings:* **1. Observatories 2. Meteorological stations 3. Argentina.**

**3C-217** 551.506:551.577.2(82)

*Reed, Wesley Wharton, **Maximum and minimum monthly precipitation figures for selected stations in France, Syria, Argentina, Palestine and Transjordan.** *U. S. Air Weather Service, Report* No. 109, **1942.** 3 p. tables. **DWB**—Report consists of tables for different regions giving precipitation maximum, minimum and mean values for varying periods of years in different countries. (*Same*

*abstract* as No. 2E–165 in May 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Precipitation data 2. Syria 3. Palestine 4. Transjordan 5. Argentina 6. France. I. U. S. Weather Bureau.**—*H.P.K.*

**3C–218** 551.582(8)

**Régimen meteorológico de la cuenca del Río de la Plata.** [Meteorological regime of the Río de la Plata valley.] *Argentina. Dirección de Meteorología, Geofísica e Hidrología, Monografía, Ser. A*, Sec. II, Pt. 2, No. 1, Fasc. 1, Vol. 1, **1944.** 32 p. numerous tables. **DWB**—In the first part, general meteorological conditions are surveyed with particular emphasis on wind—land and sea breezes, gales and frequence of winds > force 7 (Beaufort scale). The second part deals with weather changes which take place in short periods of time. The third part consists of tables presenting monthly and annual average pressure, humidity, vapor pressure, temperature, cloudiness, frosts, wind velocity, fog, haze, electric storms and precipitation; monthly frequency of wind direction and calm; monthly visibility frequency (0–10). This data is for four Argentine stations on the Río de la Plata. *Subject Headings:* **1. Climatology 2. Río de la Plata Region, Argentina.**

**3C–219** 551.506.3:551.577.2(82)

***El regimen pluviométrico de la República Argentina. Normales de lluvia de 25 años (Años 1913–1937).** [The rainfall regime of the Argentine Republic. Rainfall normals for 25 years (Years 1913–1937).] *Argentina. Dirección de Meteorología, Geofísica e Hidrología, Ser. F, Publ.* No. 2, **1943.** 37 p. tables, 13 fold. charts. **DWB**—Short discussion of rainfall normals (1913–1937). Tables and charts show monthly and annual rainfall. *Subject Headings:* **1. Rainfall normals 2. Long period records 3. Argentina.**

**3C–220** 551.506.7(82)

***Resultados de las observaciones aerológicas effectuadas con globospilotos en el observatorio regional Buenos Aires (Villa Ortuzar).** [Results of the aerological observations with pilot balloons at the regional Villa Ortuzar Observatory, Buenos Aires.] Argentina. Dirección de Meteorología, Anales Tomo XIX conteniendo las observaciones practicadas en el ano 1928 [Observations made in 1928.] **1931.** 21 p. tables, graphs. **DWB**—Twice-daily (except legal holidays and in bad weather) pilot balloon soundings taken at 8 and 14 h. are presented for various heights from 300 m to 3600 m. Tables and wind roses summarize seasonal and annual winds for 16 directions and for several levels up to 1500 m. *Subject Headings:* **1. Pilot balloon data 2. Buenos Aires, Argentina. I. Buenos Aires. Villa Ortuzar Observatorio.**

**3C–221** 551.582(82)

**Resumen mensual del tiempo en Cuyo (Mendoza, San Luis y San Juan) y La Rioja.** [Monthly summary of weather in Cuyo (Mendoza, San Luis and San Juan) and La Rioja.] *Mendoza, Argentina. Universidad de Cuyo, Boletín de Estudios Geográficos*, 1(2):67–76, **1949.** tables. **DLC**—This and some of the later numbers include a brief monthly summary of the weather and precipitation data for a number of stations in each province. *Subject Headings:* **1. Climatology 2. Precipitation data 3. Cuyo, Argentina.**

**3C–222** 551.582(82)

†Ringuelet, Emilio J., **Estudio fitogeográfico del Rincón de Viedma (Bahía de Samborambón).** [Phytogeographic study of Rincón de Viedma. (Samborambón Bay).] *La Plata, Argentina. Universidad Nacional. Facultad de Agronomía, Revista*, 21:15–186, **1936.** figs., photo. tables, biblio. p. 182–185. **DWB, DA**—Sec. V. (p. 72–83) contains a description of the climate of Dolores and Punta del Indio. Tables summarize 20 years' (1901–1920) observation of temperature, pressure, relative humidity, cloudiness, rainfall, relative frequency of wind and length of day for Dolores. Temperature, pressure, relative humidity, cloudiness and rainfall data for Punto del Indio for 1934 are summarized in one table. A systematic list of vascular plants is given (p. 137–181). *Subject Headings:* **1. Climatology 2. Plant ecology 3. Dolores, Argentina 4. Punto del Indio, Argentina.**

**3C–223** 551.582(82)

Ringuelet, Emilio J., **Geobotánico y ecología de las altas sierras de Córdoba.** [Geobotany and ecology of the high sierras of Córdoba.] *GAEA, Sociedad Argentina de Estudios Geográficos, Anales*, 8(1):81–95, **1947.** 6 figs., refs. **DLC**—A description of the climate of the area (p. 83–86) deals with temperature, relative humidity, cloudiness, radiation, winds and precipitation. *Subject Headings:* **1. Climatology 2. Córdoba Province, Argentina.**

**3C–224** 551.582(82)

*Rohmeder, Guillermo, **Observaciones meteorológicas en la regiôn encumbrada de las Sierras de Famatina y del Anconquija (Republica Argentina).** [Meteorological observations in the high

regions of Famatina and Anconquija (Argentine Republic).] *Sociedad Científica Argentina, Anales*, 163(3):47–124, Sept. **1943.** 3 figs., tables, 11 refs. **DLC**—This high area forms a meteoro-climatic island in the arid region of northwest Argentina. It escapes the general distribution of climatic factors of the arid zone and has a character all its own. The author presents an analysis of temperature, wind direction and velocity and snow for the region. The tables include observations of these and other meteorological elements taken during 1940, 1941 and 1942. *Subject Headings:* **1. Climatology 2. Fragmentary climatic data 3. Sierra de Famatina, Argentina.**

**3C–225** 91:016

†Rohmeder, Guillermo and Santamarina, Estela B. de, **Bibliografía geográfica de Tucumán.** [Geographic bibliography of Tucumán.] *Tucumán, Argentina. Universidad Nacional, Instituto de Estudios Geográficos, Monografía* 8, **1946.** 126 p. **DWB**—A classified bibliography of 559 items (with suppl.) arranged alphabetically by author, referring to the geography, economics and history of the province of Tucumán. On p. 109 will be found reference to material containing meteorological observations and climatic studies. The sources cited are in Spanish, German, French and English, with Spanish predominating. Many citations carry Spanish annotations. The index is by subject and region and a list of all the periodicals cited is included. *Subject Headings:* **1. Geography 2. Bibliographies 3. Tucumán Province, Argentina.**

**3C–226** 551.582:631.4(82)

Rudolf, G., Job, M. M. and Santini, B., **Estudio de algunos factores ecológicos en la provincia de Buenos Aires.** [Study of some ecological factors in the Province of Buenos Aires.] *La Plata, Argentina. Universidad Nacional, Museo, Notas Preliminares*, 3(1):129–155, **1934.** 4 charts, 3 tables, refs. **DLC**—The province is divided into three zones according to climatic factors and soil characteristics. The climatic and soil conditions in each zone are surveyed and soil analysis for 39 stations is made. The author concludes that different types of wheat should be grown in each zone. Isopleths of temperature, precipitation and relative humidity are included as well as tables giving the seasonal averages for these same elements for 16 stations for the period 1918–1927. *Subject Headings:* **1. Climatology 2. Soils 3. Agricultural climatology 4. Buenos Aires Province, Argentina.**

**3C–227** 551.501.45:551.574.41

Samatán, Enrique Luis, **Tabla condensada para la determinación del punto de rocío.** [Condensed table for the determination of dew point.] *Meteoros*, Buenos Aires, 1(2–3):150–159, June **1951.** 2 tables, 8 figs. Spanish and English summaries p. 150. **DWB**—An extensive "inverse" table is provided for determination of the dew point temperature from the dry and wet bulb for temperatures from −35° to 35°C. and for 1000 mb. pressure. The psychrometric formulas are given in detail. The theoretical basis for compiling the original tables and the modifications effected in preparing this simplified table, which has been used in the Argentine National Meteorological Service since 1949, are presented. *Subject Headings:* **1. Dew point tables 2. Computation tables 3. Argentina. Servicio Meteorológico.**—*M.R.*

**3C–228** 551.582.2(82)

*San Miguel, Argentina. Observatorio de Física Cósmica, **Boletín Mensual. Año 1946–1950.** [Monthly Bulletin. Year 1946–1950.] [San Miguel, Argentina, **1946–1950.**] 5 Vol. chiefly tables. **DWB**—Detailed tabular material for San Miguel, containing hourly observations and monthly averages of potential gradient, ionization of the air, atmospheric pressure, air temperature, relative humidity, vapor pressure, wind direction and velocity, cloudiness (visibility), solar radiation, earth temperature, rainfall and condition of soil. Ten-day and monthly averages for atmospheric pressure, air temperature, humidity, wind and rainfall. Ten-day and monthly frequencies of hydrometeors and other phenomena. Geographical coordinates and altitude are on title page. *Subject Headings:* **1. Climatic data 2. San Miguel, Argentina.**

**3C–229** 551.509.67 551.577.3

Schwerdtfeger, Werner, **Consideraciones acerca de la compensación global de la precipitación anual, en relación con el problema de la producción artificial de lluvias.** [Consideration on the global compensation of annual precipitation in relation to the problem of artificial production of rainfall.] *Meteoros*, Buenos Aires, 1(2–3):189–197, June **1951.** 2 tables, 8 refs. Spanish and English summaries p. 189. **DWB**—Data on variations of rainfall over large and small areas; as compiled by TANNEHILL for the United States, the Mississippi Valley and Texas, show that variations over the largest area range from +13% to −15%, and over the smaller area of Texas to as much as +49% and −47% of normal in the wettest and driest areas, respectively. This, the author claims, is proof of "compensation," or of the fact that if rain is excessive in one place it must be deficient in another. Works of C. E. P. BROOKS are cited in respect to rainfall over the globe, and BERGERON'S

ideas on artificial rainfall vs. those of LANGMUIR and SHAEFFER are reviewed. It is the author's opinion that in spite of compensation, useful additional rainfall over certain critical land areas could be produced at the expense of oceanic areas—thus not robbing other land areas while achieving economically profitable results. As further proof that this process operates in the Argentine, a statistical study is necessary. Lacking a synoptic climatic calendar such as BAUR proposed for Europe from 80 years of record, the data for 1901 to 1940 for March, April and May (120 months) for the Falkland Islands (Cape Pembroke) were analyzed by dividing the array into four groups of 30 cases each, according to anomalies of pressure. The simultaneous rainfall amounts east of Río Negro and at Malvinas for each group show that when rainfall is above normal at one, it is below normal at the other place. *Subject Headings:* **1. Artificial precipitation 2. Global precipitation compensation 3. Rainfall variations 4. Falkland Islands 5. Argentina.**—*M.R.*

**3C–230** 551.509.34:551.524

Schwerdtfeger, Werner, **Bases para el pronóstico a medio plazo de las condiciones de temperatura en el otoño de Buenos Aires.** [Bases for medium range forecasting of temperature conditions in autumn at Buenos Aires.] *Meteoros*, Buenos Aires, 1(1):33–45, Jan. **1951.** 5 tables, refs. Spanish and English summaries p. 33. **DWB**—The author indicates a need for statistical forecasting methods to compensate for the limitations of synoptic forecasting due to inadequate observational coverage of the South Pacific. A multiple correlation method for forecasting mean daily temperature is presented which uses three independent variables: 1) deviation of temperature from normal, 2) pressure difference between Buenos Aires (35°S) and Santa Cruz (50°S) and 3) interdiurnal pressure variation at Buenos Aires. The method was shown to be useful in forecasts made during 1949 by personnel of the Argentine Meteorological Service. The author points out that his technique can still be improved by introducing other parameters. (*Same abstract* as No. 2.9 46 in Sept. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Extended forecasting 2. Temperature forecasting 3. Argentina.**—*R.S.Q.*

**3C–231** 551.515.1:551.555.6(82)

Schwerdtfeger, Werner, **Das thermische Tief im nordwesten Argentiniens.** [The thermal low in northwest Argentina.] *Meteorologische Rundschau*, 4(3/4):49–52, March/April **1951.** 3 figs., 4 tables, 9 refs. **MH-BH.** Also in: *Sociedad Científica Argentina, Anales*, 151(6):255–275, June **1951. DLC**—In summer, a thermal low forms into which cold south winds break quasi-periodically. There is a high negative correlation between interdiurnal pressure and temperature changes. The cycle involves about 4 days warming by 2°C/day and 2 days cooling by 4° day. In winter, correlation is smaller and depression is a lee effect. (*Same abstract* as 2.11 75 in Nov. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Atmospheric disturbances 2. Argentina.**—*C.E.P.B.*

**3C–232** 551.587:551.524.7:551.557.3

Schwerdtfeger, Werner, **Pequeño aporte para el conocimiento de las condiciones aerológicas en el Sur de la Patagonia.** [A short report on knowledge of aerological conditions in southern Patagonia.] *Sociedad Científica Argentina, Anales*, 151(2):57–70, Feb. **1951.** figs., tables, 6 refs. Spanish and English summaries p. 69–70. **DLC**—Sixty-three hundred twice-daily (12 h, 18 h) pilot balloon observations distributed uniformly throughout each year from 1937–1947 at Río Gallegos and 120 radar observations at Malvinas from April 1948 to July 1950—30 in the spring, 15 in the summer, 45 in the autumn and 30 in winter (all at 14 h.) are compared. Conclusions drawn: 1) the annual mean of the resultant vector amounts to 265°, 11 m/sec at 700 mb and 264°, 17 m/sec at 500 mb, 2) the course of the mean isobars in southern Patagonia will have to be corrected in various climatological publications and 3) the average wind speed at 3000 m shows no annual variation but the value of the resultant vector of the summer months is greater than that of the winter. This article also appeared in German in *Meteorologische Rundschau*, 4(7/8):135–138 July/Aug. 1951. (*See item* No. 3.2 128 in Feb. 1952 *Meteorological Abstracts.*) *Subject Headings:* **1. Aerological studies 2. Upper air wind data 3. Patagonia, Argentina 4. Falkland Islands.**

**3C–233** 551.501.9:551.43(82)

Schereschewsky, P., **Una nueva estación meteorológica de altura en la República Argentina.** [A new high-level meteorological station in the Argentine Republic.] *American Meteorological Society, Bulletin*, 24:5–6, **1943.** English version p. 6. **MH-BH**—A short note on Cristo Redentor, 3900 m, Tres Cruces (Province of Jujuy, 4500 m) and Corridor de Cori (Gobernación de los Andes) at 5100 m (25°10′S., 68°25′W.). (*Same abstract* as 2K 240 in Nov. 1951 *Meteorological Abstract.*) *Subject Headings:* **1. Mountain meteorology 2. Mountain observatories 3. Andes 4. Argentina.**—*C.E.P.B.*

**3C–234** 551.5:06(09)

**78° aniversario del Servicio Meteorológico Nacional.** [Seventy-eighth anniversary of the National Meteorological Service.] *Meteoros*, Buenos Aires, 1(1):110–114, Jan. **1951. DWB**—An address given on the occasion of the seventy-eighth anniversary of the National Meteorological Service of Argentina. Its Director traces briefly the history of the Meteorological Service, making reference to the earliest continuous series of observations made in Buenos Aires (1856–1875), the creation of the National Meteorological Office (1872) which was renamed and reorganized in 1945 as the National Meteorological Service, the first published daily weather maps (1902), the first pilot balloon observations (1927) and describes the present structure of the Meteorological Service. (*Same abstract* as 2.11–5 in Nov. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Meteorological services 2. History of meteorology 3. Argentina.**—*R.S.Q.*

**3C–235** 551.509.311

Smith, Theodore B., Shipman, Robert L., Spuhler, Walter S., Ryan, Earl F. and Gallardo, Medardo. **Study of Argentina weather.** Thesis (M.A.)—California Institute of Technology. Meteorology Dept., Feb. 6, **1942.** 46 p. charts, graphs. Mimeographed. **DWB**—The study consists of five parts: Trough passages, Precipitation, Upper air stream line patterns, Temperature and Type sequences. Data was used for the period from Jan. 1938 to Sept. 1941. Accompanied by charts and histograms. *Subject Headings:* **1. Structure of disturbances 2. Synoptic forecasting 3. Argentina.**

**3C–236** 551.582:016(82)

†Sparn, Enrique, **Bibliografía meteorológica y climatológica de la República Argentina. Con un apéndice: "Literatura sobre meteorológica y climatológica de las regiones Antárctica y Sub-Antárctica Americanas."** Córdoba, **1923.** 72 p. **DWB.** Also in: *Córdoba, Argentina. Universidad Nacional. Revista*, 10(4–6):91–160, June/Aug. **1923. DLC**—This bibliography contains approximately 675 references to articles written in Spanish, German, English, French and Italian, with Spanish predominating. Imprints are for the years 1809–1923. An alphabetical arrangement by author is followed; there is no index. Subjects covered are: meteorology (wind, climate, floods, temperature, droughts, evaporation, rainfall, atmospheric circulation and solar radiation), geography, natural history, geology, hydrology, medical climatology, medical meteorology, etc. Material for Argentina as a whole, for various provinces and cities and also for Paraguay, Uruguay and Brazil is included. *Subject Headings:* **1. Climatology 2. Bibliographies 3. Argentina.**

**3C–237** 551.582:016(82)

†Sparn, Enrique, **Bibliografía meteorológica y climatológica de la República Argentina y de las regiones Antárctica y Sub-Antárctica Americanas . . . 1924–1931.** Córdoba, **1934.** 47 p. **DWB.** Also in *Córdoba, Argentina. Universidad Nacional, Revista*, 20(9/10):277–319, Nov./Dec. **1933. DLC**—Continuation of bibliography printed in 1923 and containing approximately 370 items, arranged alphabetically by author. Systematic and geographic indexes. Brief annotations in Spanish are provided for some items. Spanish, English, German and French sources are used. Usual meteorological elements: pressure, temperature, rainfall, solar radiation, etc. are covered as well as agricultural meteorology, medical meteorology, hydrology, geology, geography, aeronautical meteorology, Antarctic explorations, phyto-geography, flora and fauna. Items deal with the country as whole, various provinces and cities, Falkland Islands and the Antarctic. *Subject Headings:* **1. Climatology 2. Bibliographies 3. Argentina.**

**3C–238** 551.582:016(82)

†Sparn, Enrique, **Tercera contribución al conocimiento de la bibliografía meteorológica y climatológica de la República Argentina (Años 1941–1948).** [Third contribution to the knowledge of the meteorological and climatological bibliography of Argentina (Years 1941–1948).] *Academia Nacional de Ciencias, Boletín*, Córdoba, 38(3–4):379–414, **1949. DSI, DLC**—Cites approximately 240 items, the majority of which are in Spanish; others are in English, German, Portuguese, Dutch and Italian. Many annotations in Spanish which vary in length. The arrangement is alphabetical by author. Items deal with meteorological elements, physical geography, aeronautical meteorology, agricultural meteorology, geology, bioclimatology and hydrology. Articles refer to Argentina as a whole as well as to various cities and provinces. Some references are to neighboring countries. A geographic index is included. *Subject Headings:* **1. Climatology 2. Bibliographies 3. Argentina.**

**3C–239** 551.510.41(264)(8)

*Troili-Petersson, Gerda, **Über den Kohlensäuregehalt der Atmosphäre.** [On the content of carbon dioxide in the atmosphere.] (*K.*) *Svenska Vetenskapsakademiens, Handlingar*, Afd. 2, 23(6):1–17, **1898.** 4 tables, 4 refs. **DLC**—Extensive measurements of carbon dioxide were made in

the air of the Arctic, North Atlantic, Atlantic and Patagonia. Data are presented in tables. The atmosphere over the Atlantic Ocean contained more carbon dioxide in the cold regions than in the tropical ones. The air in Patagonia contained less carbon dioxide than the air of Scandinavia, but more than the air of the adjoining sea. (*Same abstract* as No. 3B–127 in February 1952 *Meteorological Abstracts.*) *Subject Headings:* **1. Atmospheric composition 2. Carbon dioxide 3. Atlantic Ocean 4. Arctic Ocean 5. Patagonia, Argentina.**—*N.A.S.*

**3C–240** 551.582(82):551.311.3

*Weber, Teodoro F. A., **El clima de General Pico vinculado a la erosión eolica.** [Climate of General Pico as related to wind erosion.] *GAEA, Sociedad Argentina de Estudios Geográficos, Anales,* 8(1):33–72, **1947.** 14 figs., 11 tables, 10 refs. **DLC.** Issued as a reprint by: *Argentina. Instituto de Suelos y Agrotecniá, Publicación* No. 5. **DWB**—An analysis of the climatic conditions at General Pico and an examination of the influence of meteorological factors on erosion. Temperature, humidity, cloudiness, *Pvblicatión* and wind are discussed; the last element in detail. This is followed by a study of "voladuras"—defined as the transportation by air and the temporary suspension in it of soil, dust or sand. The relation between "voladuras" and rain and wind is examined. Tabular and graphical material, including wind roses, are presented. *Subject Headings:* **1 Climatology 2. Wind erosion 3. General Pico, Argentina.**

**3C–241** 551.521.13

Wegener, Kurt, **Messungen der Sonnnestrahlung zur Prüfung der Solarkonstante.** [Measurements of solar radiation as a check on the solar constant.] *Meteorologische Rundschau,* 4(5–6):109–110, May–June **1951.** German and Spanish summaries p. 109. **MH-BH**—Observations were made at Pilar (300 m) and La Quiaca (3400 m); some of the latter giving actual values exceeding 2 cal/cm²/min. The value of 1.94 for the solar constant, adopted in 1913, does not satisfy the observations and it is concluded that the sun does not radiate according to the Boltzmann-Stefan Law. (*Same abstract* as 2.11–96 in Nov. 1951 *Meteorological Abstract.*) *Subject Headings:* **1. Solar radiation 2. Solar constant 3. Argentina.**—*C.E.P.B.*

**3C–242** 551.521.13

Wegener, Kurt, **Die wirkliche Solarkonstante.** [The true solar constant.] *Geofisica Pura e Applicata,* 19(3–4):170–172, **1951.** ref. **MH-BH**—Average and extreme values of the solar constant, according to various authors, are enumerated and the value of 2.4 given as the "true" value, after corrections for atmospheric radiation and albedo of bulb had been applied to numerous observations made at La Quiaca, Argentina (3400 m) during December 1950. The actual high value of 2.47 for the southern summer is in keeping with the anomaly due to proximity of the sun at that season. (*Same abstract* as 2.11–95 in Nov. 1951 *Meteorological Abstract.*) *Subject Headings:* **1. Solar constant 2. La Quiaca, Argentina.**—*M.R.*

**3C–243** 551.521.13

*Wegener, Kurt, **Verificación experimental de la constante solar.** [Experimental verification of the solar constant.] *Meteoros,* Buenos Aires, 1(2–3):171–182, June **1951.** fig., 5 tables, 5 refs. Spanish and English summaries p. 171. **DWB**—Detailed observations of solar radiation made at Pilar, La Quiaca and Min Aguilar Observatories in Argentina are presented for various solar angles and the solar constant calculated. The internationally (1913) accepted constant of 1.94 is considered erroneous and the reasons given. The constant determined by Abbot, Wilsing, Müller and Kqún of 2.4 ly (langley) per min. verified. The instruments used and results obtained are discussed in connection with the physical surroundings. *Subject Headings:* **1. Solar constant 2. Argentina.**—*M.R.*

**3C–244** 551.555.8 551.509

†Wölcken, Kurt, **Descripción de una violenta tempestad de polvo.** [Description of a violent dust storm.] *Meteoros,* Buenos Aires, 1(2–3):211–216, June **1951.** 4 figs., table. Spanish and English summaries p. 211. **DWB**—Describes in detail a dust storm observed in the western part of the province of Buenos Aires about 30 kilometers north of Coronel Saurez on Jan. 18, 1951 following a long period of dry weather. What looked to be a bank of clouds was found on closer observation to be dust. The storm had all the characteristics of the haboob of the Sudan. A synoptic analysis of the weather is made and illustrated by a chart. The dust storm was extreme because of soil conditions; in the other areas this phenomena would not have occurred or would have been a normal situation. *Subject Headings:* **1. Dust storms 2. Synoptic analysis 3. Buenos Aires Province, Argentina.**

**3C–245** 551.524.31

†Wölcken, Kurt, **La situación meteorológica excepcional en la República Argentina durante los días 7 al 13 de mayo de 1950.** [Unusual meteorological conditions in the Argentine Republic from May 7–13, 1950.] *Ciencia e Investigación*, Buenos Aires, 6(7):327–330, July 6, **1950.** 3 figs., table. Abstracted from reprint. **MH-BH**—Record high temperatures occurred in Buenos Aires, the mean on May 9–13 being 10°C above normal for the days. Analyzed charts for May 8 and 11 show an influx of tropical air from Brazil. (*Same abstract* as No. 2.5–98 in May 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Temperature variations 2. Argentina.**—*C.E.P.B.*

**3C–246** 551.582.2(82)

Würschmidt, J., **Klimabeobachtung in Tucumán (Argentinien).** [Climatic observation in Tucumán (Argentina).] *Meteorologische Zeitschrift*, 43(10):376–377, **1926.** tables. **DWB**—Brief summary tables of rainfall and temperature data for Tucumán for a 40-year period (1883–1923). *Subject Headings:* **1. Rainfall data 2. Temperature data 3. Tucumán, Argentina.**

**3C–247** 551.511:551.594.11

Yriberry, A. J., **Gradiente de potencial atmosférico negativo concielo despejado.** [Negative atmospheric potential gradient during clear weather.] *San Miguel, Argentina. Observatorio de Física Cósmica, Cuaderno* No. 1, **1950.** 6 p. 8 refs. **MH-BH**—During Dec. 1949 and Jan. 1950 a very intense and prolonged period of negative electric field occurred during clear skies. Wind speed, direction, relative humidity and dust are discussed with respect to this phenomenon and its cause. (*Same abstract* as No. 2.1–71 in Jan. 1951 *Meteorological Abstracts.*) *Subject Headings:* **1. Dynamics of the atmosphere 2. Potential gradient 3. Argentina. I. San Miguel, Argentina. Institutos de Investigación. Acta Scientifica.**—*M.R.*

## SUPPLEMENTARY MATERIAL

**3C–248** 551.582(82)

Bonfils, Constante G., **Estudio agrohidrologico en el valle del Río Lavayén.** [Agro-hydrological study in the valley of the Lavayén River, Argentina.] *Instituto de Suelos y Agrotecnia, Publicación* No. 18, **1951.** 60 p. 22 figs. **DWB**—Analyses of the soils and river water of this region to determine their suitability for irrigation purposes. Chap. II (p. 19–20) deals briefly with the climate. Tables give monthly precipitation and monthly maximum and minimum temperatures for Aforos. The climate is classified as semi-dry and -hot with dry, mild winters. An annual average rainfall of 600 mm indicates the need for irrigation. *Subject Headings:* **1. Climatology 2. Lavayén River Valley, Argentina.**

**3C–249** 551.584 551.524.4(82)

*Burgos, Juan J., Cagliolo, Alberto and Santos, Modesto C., **Exploración microclimática en la selva Tucumano-Oranense.** [Microclimatic study in the Tucumán-Oranense rain forest.] *Meteoros*, Buenos Aires, 1(4):314–341, Dec. **1951.** 8 figs., 8 tables, refs. Spanish and English summaries p. 314. **WDB**—A microclimatic study carried out in the Tucuman-Orán rain forest to determine the frost hazard as a guide to the selection of suitable crops to grow in the area. The plant life, topography and climate are described. As to the latter, it may be classified as humid, mesothermal, with little variation in effective humidity, and with a limited summer concentration of thermal efficiency (p. 319). A map shows the location of 9 stations—6 in the forest and 3 in the valley of the San Francisco River. These stations are classified as complete or emergency depending upon the equipment. A typical synoptic situation which leads to frost formation is described and illustrated by a chart for the period 1939–1950. A table shows the days with damaging frost in the same period. Included is a detailed microclimatic study carried out in August 1950 covering the probability of minimum absolute temperature, solar radiation and soil temperature, air temperature and humidity and effect of frost. *Subject Headings:* **1. Microclimatology 2. Frost frequencies 3. Agricultural meteorology 4. Salta (Province), Argentina.**

**3C–250** 551.579.5(82)

Colqui, Benito S., **Posibles causas del descenso de la napa freatica observado en la zona de Río Seco (Provincia de Córdoba).** [Possible causes of the lowering of the ground water level observed in the zone of Río Seco (Province of Córdoba).] *Meteoros*, Buenos Aires, 1(2/3):206–210, June **1951.** fig. Spanish and English summaries p. 206. **DWB**—An examination of 10-year averages (1910–1949) and annual averages (1940–1949) shows that the lowering of the water level could not be attributed to decrease in rainfall. Then a study was made of the geological formation of the area by digging a hole 30 m deep and analyzing the various layers of soil. The author gives two possible causes of the lowering of the water level: 1) heavy rains have caused erosion which has left

a layer of calcium which is not easily penetrated by rainfall and 2) the slope of the land causes rainwater to flow off rapidly. The remedy is to build one large or several small dams to hold back the rainwater and allow time for penetration. *Subject Headings:* **1. Ground water 2. Córdoba Province, Argentina.**

**3C–251** 551.509.3:519.2

Dedebant, G., **Sobre la previsión estadística del tiempo.** [On statistical weather forecasting.] *Meteoros*, Buenos Aires, 1(4):251–276, Dec. **1951.** 5 figs., 2 graphs, refs., equations. Spanish and French summaries p. 251. **DWB**—A consideration of the variable range of application of the laws of hydrodynamics and thermodynamics in practical forecasting leads to a predilection for statistical methods employing auto- and multiple-correlations. Multiple correlation coefficients for several Argentine stations and auto-correlations for Buenos Aires alone are calculated using pressure data for July 1942. Similar work done by T. E. SHUMANN in South Africa is cited. The author expresses the hope that such calculations will be made on a world wide basis under auspices of the W. M. O. *Subject Headings:* **1. Statistical forecasting 2. Correlations 3. Argentina.**—*R.S.Q.*

**3C–252** 551.582(82, 94)

Prescott, J. A., Collins, Joyce A. and Shirpurkar, G. R., **The comparative climatology of Australia and Argentina.** *Geographical Review*, New York, 42(1):118–133, Jan. **1952.** 10 figs. (charts and graphs), tables, 13 refs. **DLC**—Comparisons of the climate of Australia and Argentina "based on estimates of the length of the season of effective rainfall and its timing and on the establishment of roughly parallel temperature regimes." A climatic index for moisture, $P/s.d.\cdot^{75}$, is derived and charts are presented to show the rainfall efficiency by month for Argentina and Australia based on this index. The length of the growing season and the temperature regimes of the two countries are discussed and shown graphically. Detailed comparison between Huinco Renancó in Córdoba Province, Argentina and Forbes, N.S.W. and Rutherglen, Vic. in Australia (all wheat growing areas in the temperate zone) illustrate the method of study outlined. Temperature, rainfall and rainfall efficiency and the moisture regimes as determined by rainfall, potential evapotranspiration and soil storage are presented in graphs for the three stations. A table gives moisture data. *Subject Headings:* **1. Climatology 2. Argentina 3. Australia.**

**3C–253** 551.524.4(82)

Prohaska, Federico J. and García, María Teresa Ugarteche de, **Gradiente vertical de temperatura en la zona central de la Cordillera.** [Vertical temperature gradient in the central zone of the Cordillera.] *Meteoros*, Buenos Aires, 1(4):342–343, Dec. **1951.** 2 tables. **DWB**—Data poor compared to other mountain stations; the authors had to use every possible station without regard to simultaneity of the period, orographic situation or the horizontal distance. This study is based on observations in January and July for a period of 10 years for each pair of stations, except Cristo Redento. *Subject Headings:* **1. Vertical temperature gradient 2. Cordillera Region, Argentina.**

**3C–254** 551.543.1(82)

Wegener, Kurt, **Análisis de la variación diurna de la presión en la República Argentina.** [Analysis of the diurnal variation of pressure in the Argentine Republic.] *Meteoros*, Buenos Aires, 1(4): 305–313, Dec. **1951.** 3 figs., table. Spanish and English summaries p. 305. **DWB**—The diurnal variation of pressure in Argentina is presented in graphs for a number of stations. A comparison of Mar del Plata with Mendoza and Cipolletti shows that a station's distance from the sea (or its continentality) accentuates the pressure variation; comparison of Tucumán, Córdoba, Colonia Sarmiento and Año Nueva proves that pressure variation diminishes rapidly with rising latitude. The effects of geographic location, clear and cloudy sky, and vertical movement of air on pressure variations are also considered. *Subject Headings:* **1. Diurnal pressure variations 2. Argentina.**

# PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

**Note:** The contents of periodicals included in this section are for information only, and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of date of publication, the pagination will be omitted.

**American Geophysical Union, Transactions,** Volume 33, Number 1, February 1952.

Yih, Chia-shun: **On a differential equation of atmospheric diffusion,** p. 8–12.
Weiss, L. L.: **Moisture accumulation rates in thunderstorm cells,** p. 13–20.
Spreen, William C. and Manos, Nicholas E.: **Probabilities from limited weather data,** p. 21–26.
Schell, I. I.: **Stability and mutual compensation of relationships with the iceberg severity off Newfoundland,** p. 27–31.
Krick, I. P. and Smith, T. B.: **Some evaluations of sustained cloud-seeding operations,** p. 52–56.
Blaney, Harry F.: **Determining evapotranspiration by phreatophytes from climatological data,** p. 61–66.
Croft, A. R.: **Report of the Committee on evaporation and transpiration,** p. 119–122.
Schaefer, Vincent J. and Gerdel, R. W.: **The formation of frazil and anchor ice in cold water,** p. 127–128.
O'Brien, M. P. and Morison, J. R.: **The forces exerted by waves on objects,** p. 32–38.
Ju, Yi-yuan: **Breaking of waves by an opposing current,** p. 39–41.
Bosazza, V. L.: **On the storage of water in rocks in Situ,** p. 42–48.
Aronovici, V. S.: **Laboratory evaluation of desert soil for irrigation,** p. 49–52.
Robinson, T. W.: **Phreatophytes and their relation to water in Western United States,** p. 57–61.
Turner, S. F. and Skibitzke, H. E.: **Use of water by phreatophytes in 2000-foot channel between Granite Reef and Gillespie Dams, Maricopa County, Arizona,** p. 66–72.
Bowser, Curtis W.: **Water conservation through elimination of undesirable phreatophyte growth,** p. 72–74.
Koogler, John G.: **Phreatophyte control on irrigation projects in New Mexico,** p. 74–77.
Cramer, Seldon F.: **Activities of the South Pacific Division, Corps of Engineers, in eradication and control of phreatophytes,** p. 77–80.
Fries, Carl, Jr. and Gutiérrez, Celedonio: **Activity of Paricutin volcano from January 1 to June 30, 1951,** p. 91–100.

**American Meteorological Society, Bulletin,** Volume 32, Number 10, December 1951.

Hunter, Marvin N.: **Katallobaric centers and the subsequent occurrence of precipitation at Washington, D. C.,** p. 363–370.
Currie, B. W.: **Sensations isopleths on a wind-temperature diagram for winter weather on the Canadian Prairies,** p. 371–374.
Jordan, Charles L.: **Charts of the horizontal components of the mean surface wind over the oceans for January and July,** p. 375–379.
Jones, Herbert L.: **A sferic method of tornado identification and tracking,** p. 380–385.
Conover, John H.: **A new combination anemometer, wind vane and wind direction recorder for Mt. Washington Observatory,** p. 386–390.
Gentilli, J.: **On the stratification of the atmosphere,** p. 391.

**Angewandte Meteorologie,** Volume 1, Number 3, December 1951.

Israël, Hans: **Die Luftelektrizität im Rahmen der Bioklimatologie. Vorträge und Diskussionen zum obigen Thema am 6/7 März 1951 in Buchau a.F. und Schussenried,** [Atmospheric electricity in the sphere of bioclimatology. Introduction and discussions . . . at Buchau and Schussenried], p. 65–69.
Meinhold, Heinz: **Die atmosphärische Störungen,** [Atmospherics (static)], p. 70–77.
Schrödter, H.: **Über die Bedeutung des Mikroklimas für die Entwicklung parasitischer Pilze der Gattung Ascochyta (Erreger der Brennfleckenkrankheit der Erbse),** [On the importance of microclimate for the development of parasitic fungi of genus Ascochyta (cause of burn-spot disease of the pea)], p. 79–85.

Unger, Kurt: **Bearbeitung der Bodentemperaturen von Quedlenburg,** [Tabulation of the earth temperatures at Quedlenburg], p. 85–90.

Mann, Heinrich: **Ein Beispiel starken sommerlichen Bodenfrostes,** [An example of a severe summer ground frost], p. 91–92.

Schrödter, H.: **Bodenfeuchtigkeitsmessungen in einer Himbeerparzelle mit unterschiedlich behandelten Teilstücken (Beitrag zur Frage des Einflusses von Kulturmassnahmen auf die Bodenfeuchtigkeitsverhältnisse),** [Soil moisture measurements in a raspberry plot with strips differently treated (contribution to the question of the influence of cultivation on soil moisture conditions], p. 92–94.

**Angewandte Meteorologie,** Volume 1, Number 4, January 1952.

Israël, Hans: **Die Luftelektrizität im Rahmen der Bioklimatologie. Teil II,** [Atmospheric electricity in the sphere of bioclimatology. Pt. II], p. 97–104.

Lehmann, P.: **Sperrschichteneinfluss auf das Bioklima,** [Influence of blocking layers on bioclimate], p. 104–105.

Rassow, Lothar: **Der effektive Niederschlag in Mitteldeutschland,** [Effective precipitation in central Germany], p. 106–114.

Reinhard, H.: **Zur Kenntnis der Schneedeckenverhältnisse in Mecklenburg,** [Snow cover conditions in Mecklenburg], p. 114–119.

Würfel, Heinz: **Die Häufigkeit des Auftretens von Tau und Reif in Eisleben,** [Frequency of occurrence of dew and rime in Eisleben], p. 119–120.

Hoffmeister, J.: **Verteilung des Windes auf die Windrichtungen und Geschwindigkeitsstufen als Grundlage für praktische Anlagen,** [Distribution of wind by direction and velocity as a basis for practical installations], p. 121–127.

**Annalen der Meteorologie, Medizin-meteorologische Hefte,** Number 6, 1951.

Cyran, W.: **Zur Untersuchungsmethodik auf Meteorotropie,** [On investigation technique into meteorotropy], p. 1–8.

Buck, Alfred: **Die Bedeutung des Elektrodermatograms in der Meteorologie,** [The importance of the electrodermatogram in meteorology], p. 9–14.

Hawickhorst, Heinrich: **Das psychische Bild der Höhenkrankheit,** [The psychological view of height sickness], p. 14–15.

Hawickhorst, Heinrich: **Medizinische Beobachtungen in Höhen über 5000 meter,** [Medical observations at heights above 5000 m.], p. 16–17.

Leistner, Walter: **Die hygienische und bioklimatische Bedeutung des Dampfdruckes in Innenräumen und die Behaglichkeits- und Schwülegrenze,** [The hygienic and bioclimatic importance of vapor pressure indoors and the limits of comfort and sultriness], p. 18–31.

Struller, Th. and Schröder, E.: **Beeinflussen tellurische Faktoren Geburtszeitpunkt und -dauer bzw. Weheneintritt und -stärke?,** [Do telluric factors influence time and duration of birth or occurrence and severity of birth labor?], p. 31–34.

Kanz, Ewald: **Biologische Messmethoden in der Meteorobiologie,** [Biological methods of measurement in meteorobiology], p. 34–37.

Dammann, Walter: **Klima und Energieentfaltung der Völker,** [Climate and energy of peoples], p. 38–48.

**25-Jahr-Feier der Bioklimatischen Forschungsstelle Wyk auf Föhr,** [25-year anniversary of the bioclimatic research center Wyk on Föhr], p. 49–52.

**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,** Volume 3, 1951.

Flohn, H.: **Passatzirklulation und äquatoriale Westwindzone,** [Trade wind circulation and equatorial west wind zone], p. 3–15.

Thornthwaite, C. W. and Mather, John R.: **The role of evapotranspiration in climate,** p. 16–39.

Bossolasco, Mario: **Zur Frage der Verdunstung auf dem Meere,** [On the question of evaporation at sea], p. 40–46.

de Quervain, M.: **Zur Verdunstung der Schneedecke,** [On the evaporation of the snow cover], p. 47–64.

Landsberg, H.: **Some recent climatic changes in Washington, D. C.,** p. 65–71.

Prohaska, F.: **Zur Frage der Klimaänderung in der Polarzone des Südatlantiks,** [On the question of the change of climate in the polar zone of the South Atlantic], p. 72–81.

Winter, H.: **Änderungen im Sommerklima seit 150 Jahren,** [Changes in the summer climate in 150 years], p. 82–90.

Ekhart, E.: **Der Wind als Klimafaktor und als Indikator für Klimaschwankungen. Zugleich ein Beitrag zur dynamischen Klimatologie,** [The wind as a climatic factor and as an indicator of climatic oscillations. Also a contribution to dynamic climatology], p. 91–109.

Reinhard, H.: **Höhenwindverhältnisse im Gebiete des Ärmelkanals,** [Upper wind conditions in the region of the English Channel], p. 110–122.

Bider, M. and Thams, J. C.: **Das Niederschlagsregime nord- und südwärts der Alpen auf Grund zehnjähriger Pluviographenregistrierungen,** [The rainfall regime north and south of the Alps on the basis of 10-year pluviograph records], p. 123–148.

Ramdas, L. A.: **Micro-climatological investigations in India,** p. 149–167.

Hesse, W.: **Ein neues, stark empfindliches Temperatur-Feuchte-Messgerät,** [A new, very sensitive, temperature-humidity measuring apparatus], p. 168–171.

Eckel, O.: **Über die Veränderlichkeit und Reduzierbarkeit von Mittelwerten der Fluss- und Seetemperaturen,** [On the variability and reducibility of mean values of river and lake temperatures], p. 172–188.

Tollner, Hanns: **Über Schwankungen von Mächtigkeit und Dichte ostalpiner Firnfelder,** [On variations of thickness and density of East Alpine firn fields], p. 189–208.

Nicolet, M.: **Sur la determination du flux energétique du rayonnement extraterrestre du soleil,** [On the determination of the energy flux of the extra-terrestrial solar radiation], p. 209–219.

Albrecht, F.: **Intensität und Spektralverteilung der Globalstrahlung bei klarem Himmel,** [Intensity and spectral distribution of global radiation with a clear sky], p. 220–243.

Goldschmidt, J.: **Untersuchung zur Globalstrahlung,** [Investigation of global radiation], p. 244–255.

Sauberer, Franz and Dirmhirn, Inge: **Untersuchungen über die Strahlungsverhältnisse auf den Alpengletschern. (Messungen auf dem Hohen Sonnblick im Sommer 1950),** [Investigations of the radiation conditions on Alpine glaciers (measurements on the High Sonnblick in summer 1950)], p. 256–269.

Socher, H.: **Brechzahl und Refraktion der atmosphärischen Luft,** [Refractive index and refraction of atmospheric air], p. 270–274.

Lauscher, F.: **Über die Verteilung der HILLschen Abkühlungsgrösse auf der Erde,** [On the distribution of HILL's cooling power over the earth], p. 275–288.

Sargent, F.: **A critique of homeostasis: season and metabolism,** p. 289–296.

Lossnitzer, H.: **Die Bedeutung des elektromagnetischen Erdfeldes in der Bioklimatologie,** [The importance of the terrestrial electromagnetic field in bioclimatology], p. 297–307.

Berg, H.: **Statistische Untersuchungen zur Meteorotropie der fulminanten Lungenembolie,** [Statistical investigations of the meteorological relations of fulminant lung embolism], p. 308–323.

**Ciel et Terre,** Volume 67, Number 7/8, July/August 1951.

Defrise, Pierre: **Propos sur la météorologie,** [Discourse on meteorology], p. 134–139.

Guizonnier, R.: **Lien entre le gradient de potentiel électrique terrestre, l'humidité relative et la température,** [Relation between the gradient of the earth's electric field, the relative humidity and temperature], p. 140–141.

Van Mieghem, Jacques: [**Review of R. Scherhag's "Neue Methoden der Wetteranalyse und Wetterprognose"**], p. 141–144.

**Ciel et Terre,** Volume 67, Number 9/10, September/October 1951.

No articles on meteorology.

**Ciel et Terre,** Volume 67, Number 11/12, November/December 1951.

Poncelet, Lucien: **Notes sur les halos, parhélies et autres phénomènes d'optique atmosphérique,** [Notes on halos, parhelia and other atmospheric optical phenomena], p. 196–203.

**Hemel en Dampkring,** Volume 50, Number 1, 1952.

Tunzaad, H.: **Brongas en barometerstand,** (Gas wells and height of the barometer), p. 6–8.

Groen, P.: **Over de Golfstrom en ons klimaat,** (About the Gulf stream and our climate), p. 3–5.

ten Kate, H.: **Sint Elmusvuur,** (St. Elmo's Fire), p. 1–3.

**Hemel en Dampkring,** Volume 50, Number 2, 1952.

Houtgast, J.: **De eclipsexpeditie naar Khartoem,** [The eclipse expedition to Khartoum], p. 21–23.

Hagelen, W. J. H.: **Een babbeltje over strenge winters,** [A little prattle about cold winters], p. 24.

Van Diggelen, J.: **Het vreemde lichtverschijnsel van 12 Februari 1951,** [Unusual optical phenomenon of Feb. 12, 1951], p. 25–32.
ten Kate, H.: **Fata Morgana,** p. 32–34.
Goverde, J. C.: **Over het waarnemen van luchtspiegelingen,** [Observation of mirages], p. 34.

**Indian Journal of Meteorology and Geophysics,** Volume 2, Number 3, July 1951.

Mallik, A. K.: **The control of the micro-climate for given practical purposes,** p. 165–171.
Das, P. K.: **On the use of convergence charts over the Indian Region,** p. 172–179.
Sen, S. N.: **On the utility of correcting Barometric tendencies for normal diurnal variations for forecasting in India,** p. 179–189.
Chacko, Oommen: **Further studies on the heat radiation from the night sky at Poona,** p. 190–196.
Das, J. C.: **On certain aspects of rainfall at Cherrapunji,** p. 197–202.
Tandon, A. N.: **A simplified model of Wood-Anderson Seismograph,** p. 203–212.
*Notes and News*
**World Meteorological organisation,** p. 213–215.
**Fog at Bombay during February and March 1951,** p. 216.
**Condensation trail Delhi on 29 March 1951,** p. 216.
**Earthquake at Bombay 9 April 1951,** p. 216.
**Kodaikanal solar and magnetic data, January–March 1951,** p. 216–220.
**Waterspout near Diamond Harbour (West Bengal) on 20 March 1951,** p. 221.
*Letters to the Editor*
Agarwala, K. S.: **The rate of atmospheric ionization and the air-earth current at Poona,** p. 224–226.
Ray Choudhuri, S. N.: **On the growth of instability from precipitation,** p. 226–228.
Venkiteshwaran, S. P. and Yegnanarayanan, S.: **Radar measurements of upper winds over Poona during the southwest monsoon,** p. 228–232.
Pramanik, S. K. and Rao, K. N.: **Hydrometeorology of Koyna catchment,** p. 232–234.
Chandra, F/o K.: **Destructive thunderstorm over Ambala on 18 May 1950,** p. 235–238.

**Indian Journal of Meteorology and Geophysics,** Volume 2, Number 4, October 1951.

Roy, A. K.: **Rain-making and its possibilities in India,** p. 241–249.
Desai, B. N. and Koteswaram P.: **Air masses and fronts in the monsoon depressions in India,** p. 250–265.
Ananthakrishnan, R. and Sanker Narayan, P. V.: **Observations of some meteorological phenomena from the Kodaikanal observatory,** p. 265–277.
Agarwala, K. S.: **On the gustiness of wind and occurrence of gusts at Vishkhapatnam,** p. 277–283.
Misra, R. K.: **Further studies on the carbon dioxide factor in the air and soil layers near the ground,** p. 284–292.
*Notes and News*
**India Meteorological Department Directors' Conference,** p. 293.
**Waterspout off Saurashtra Coast,** p. 294.
**Severe thundersquall over Bagumpet on 17 May, 1951,** p. 294–295.
**Kodaikanal solar and geomagnetic data, April–June, 1951,** p. 299–304.
*Letters to the Editor*
Roy, A. K.: **On the incidence of fog during winter in Calcutta and neighborhood,** p. 305–306.
Suryanarayana, D. and Kachare, N. R.: **A note on the behaviour of radiosonde balloons during rain,** p. 306–308.
Krishna Rao, D. and Menon, P. A.: **Utility of precipitation index for local forecasting at Bombay during the monsoon months,** p. 309.

**Journal of Atmospheric and Terrestrial Physics,** Volume 2, Number 1, 1951.

Bates, D. R. and Massey, H. S. W.: **The negative ion concentration in the lower ionosphere,** p. 1–13.
Ellison, T. H.: **The propagation of sound waves through a medium with very small random variations in refractive index,** p. 14–21.
Försterling, Karl and Wüster, Hans-Otto: **Über die Entstehung von Oberwellen in der Ionosphäre,** [On the generation of higher harmonics in the ionosphere], p. 22–31.
Kasemir, H. W.: **An apparatus for simultaneous registration of potential gradient and air-earth current (Description and first results),** p. 32–37.
Rawer, K.: **Comparaison des résultats des mesures de l'absorption ionosphérique effectuées par deux stations européennes,** [Comparison of the results of measurements of ionospheric absorption made by two European stations], p. 38–50.

Bibl, K. and Rawer, L.: **Les contributions des régions D et E dans les mesures de l'absorption ionosphérique,** [The contributions of regions D and E in the measurements of ionospheric absorption], p. 51–65.

Osborne, B. W.: **Ionospheric behaviour in the $F_2$ region at Singapore,** p. 66–78.

Stranz, Dietrich: **Weitere Ergebnisse der Fade-out Statistik,** [Further results of fade-out statistics], p. 79–82.

**Journal of Atmospheric and Terrestrial Physics,** Volume 2, Number 2, 1952.

Shinn, D. H. and Whale, H. A.: **Group velocities and group heights from the magneto-ionic theory,** p. 85–105.

Northover, F. H.: **The anomalous propagation of radio waves in the 1–10 metre band,** p. 106–129.

Rubin, Sylvian: **Liquid particles in atmospheric haze,** p. 130–140.

**Journal of Geophysical Research,** Volume 56, Number 4, December 1951.

Ratcliffe, J. A.: **A quick method for analysing ionospheric records,** p. 463–485.

Ratcliffe, J. A.: **Some regularities in the F2 region of the ionosphere,** p. 487–507.

Elterman, Louis: **The measurement of stratospheric density distribution with the searchlight technique,** p. 509–520.

Salzberg, C. D. and Greenstone, R.: **Systematic ionospheric winds,** p. 521–533.

Hines, C. O.: **Wave packets, the Poynting vector, and energy flow: Part IV—Poynting and Macdonald velocities in dissipative anisotropic media (conclusion),** p. 535–544.

Callahan, Rita C., Coroniti, S. C., Parziale, A. J. and Patten, R.: **Electrical conductivity of air in the troposphere,** p. 545–551.

Hess, Victor F.: **Further determinations of the concentration of condensation nuclei in the air over the North Atlantic,** p. 553–556.

Hess, Victor F. and O'Donnell, George A.: **On the rate of ion formation at ground level and at one meter above ground,** p. 557–562.

Ashburn, Edward V.: **An aid for computing the density of the upper atmosphere,** p. 563–565.

Davis, Dorothy N.: **Variation of [*01*] emission (5577) on the night of 5/6 January 1951,** p. 567–575.

Götz, F. W. Paul and Nicolet, M.: **Sur des observations à la limite ultraviolette du spectre du ciel nocturne,** [On observations of the ultraviolet end of the night sky spectrum], p. 577–582.

Johnson, F. S., Purcell, C. D. and Tousey, R.: **Measurements of the vertical distribution of atmospheric ozone from rockets,** p. 583–594.

Burkard, Otto: **Isanomalen der F2-Ionisation,** [Isanomalies of the F2-ionisation], p. 595–600.

Hoag, Arthur A.: **Photoelectric observations of lightning,** p. 610–611.

Davids, Norman: **A geometric interpretation of the II-wave and coupling factor in ionospheric long-wave theory,** p. 611–612.

Wells, H. W.: **Spot-frequency ionospheric recording—a combination of sweep- and fixed-frequency techniques,** p. 613–615.

**Journal of Meteorology,** Volume 8, Number 5, October 1951.

Atlas, David and Banks, Harold C.: **The interpretation of microwave reflections from rainfall,** p. 272–282

aufm Kampe, H. J. and Weickmann, Helmut K.: **The effectiveness of natural and artificial aerosols as freezing nuclei,** p. 283–288.

Ramage, C. S.: **Analysis and forecasting of summer weather over and in the neighborhood of South China,** p. 289–299.

Schmidt, F. H.: **Streamline patterns in equatorial regions,** p. 300–306.

Kuo, Hsiao-lan: **Vorticity transfer as related to the development of the general circulation,** p. 307–315.

Frenkiel, F. N.: **Frequency distributions of velocities in turbulent flow,** p. 316–320.

Reed, Richard J. and Julius, Anthony L.: **A quantitative analysis of two proposed mechanisms for vertical ozone transport in the lower stratosphere,** p. 321–325.

Hosler, C. L.: **On the crystallization of supercooled clouds,** p. 326–331.

Klein, William H.: **A hemispheric study of daily pressure variability at sea level and aloft,** p. 332–346.

Kammer, E. W. and Dinger, J. E.: **Hurricane swell as a generator of microseisms,** p. 347–353.

Langwell, Patricia A.: **The onset of rain from cumuli,** p. 354–356.

White, Rober M. and Jung, Glenn H.: **Large-scale atmospheric exchange processes as diffusion phenomena,** p. 356–358.

Kampé de Fériet, J.: **Averaging processes and Reynolds equations in atmospheric turbulence,** p. 358–361.
McDonald, James E.: **Remarks on "Sea salt in a tropical storm."** Reply by Woodcock, Alfred H., p. 362–363.
Crain, C. M. and Gerhardt, J. R.: **On a new method for the study of atmospheric turbulence near the earth's surface,** p. 363–365.
Dingle, A. N. and Nexsen, W. E., Jr.: **An observation of the freezing of droplets in ion tracks,** p. 365–366.

**Journal of Meteorology,** Volume 8, Number 6, December, 1951.

Court, Arnold: **Temperature frequencies in the United States,** p. 367–380.
Phillips, Norman A.: **A simple three-dimensional model for the study of large-scale extratropical flow patterns,** p. 381–394.
Hsu, E. H.: **A general equation of horizontal mass divergence in the atmosphere,** p. 395–397.
Gleeson, Thomas A.: **On the theory of cross-valley winds arising from differential heating of the slopes,** p. 398–405.
Donn, William L.: **Frontal microseisms generated in the western North Atlantic ocean,** p. 406–415.
Braham, R. R., Reynolds, S. E. and Harrell, J. H., Jr.: **Possibilities for cloud seeding as determined by a study of cloud height versus precipitation,** p. 416–418.
Perkins, D. T. and Gustafson, A. F.: **Differential relations between quantities projected from meteorological surfaces,** p. 418–420.
Panofsky, Hans and Grutcher, Harold L.: **Horizontal momentum flux due to small-scale turbulence,** p. 420–421.
Gabriel, Jack E. and Bellucci, Raymond: **Time variation of winds aloft,** p. 422–423.
Kerker, M., Langleben, O. and Gunn, K. L. S.: **Scattering of microwaves by a melting spherical ice particle,** p. 424.

**Journal Scientifique de la Météorologie,** Volume 3, Number 11, July/September 1951.

Tassëel, R.: **Sur la visibilité des sources lumineuses de balisage,** [On the visibility of boundary lights], p. 77–85.
Facy, L.: **Éclatement des lames minces et noyaux de condensation,** [Bursting of small bubbles and condensation nuclei], p. 86–98.
Kiveliovitch, M. and Roulleau, J.: **Évolution des gouttes d'eau dans l'atmosphère,** [Growth of water droplets in the atmosphere], p. 99–106.
Raout, L.: **Remarques sur la répartition de l'humidité en altitude,** [Remarks on the distribution of humidity aloft], p. 107–111.

**La Météorologie,** 4th Ser., Number 22, April/June 1951.

Guilmet, B.: **Note sur la météorologie tropicale. Introduction au bulletin d'études du service météorologique du groupe Antilles-Guyane,** [Note on tropical meteorology. Pt. 2. Introduction to the bulletin of the meteorological service of the Antilles-Guiana group], p. 77–97.
Fontaine, P.: **Les "gouttes d'air froid" sur l'Europe, la Méditerranée et l'Atlantique Est,** ["Cold air drops" over Europe, the Mediterranean and the East Atlantic], p. 98–112.
Gatineau, A.: **Routes aériennes de durée minimum,** [Shortest air routes], p. 113–127.
Dessens, H.: **Le soleil bleu de septembre 1950,** [The blue sun of September 1950], p. 128–131.
Sanson, J.: **Localités d'où ont été signalés, le 27 septembre 1950, des "soleil bleus" ou des "lunes bleues,"** [Localities where "blue suns" and "blue moons" have been seen on September 27, 1950], p. 132–134.
Shalem, N.: **La neige en Palestine en février 1950,** [Snow in Palestine in February 1950], p. 135–138.
Sanson, J.: **Une méthode un peu simpliste de prévision du temps à longue échéance,** [A simplistic method of long range forecasting], p. 139–141.

**Meteorological Magazine, London,** Volume 81, Number 955, January 1952.

Bushby, F. H.: **Forecasting methods based on barotropic wave theory,** p. 1.
Murray, R.: **Rain and snow in relation to the 1000–700-mb. and 1000–500-mb. thicknesses and the freezing level,** p. 5.
Johnston, D. W.: **Relation of visibility to wind in Cyrenaica,** p. 8.
Buchanan, R. A.: **Humidity corrections in the evaluation of height from a tephigram,** p. 11.

Szczyrbak, S.: **Funnel cloud over the Wash,** p. 25.
Belasco, J. E.: **Freezing days in Great Britain,** p. 26.
**Exceptionally unsettled weather in Malta, autumn 1951,** p. 27.
**Green Flash,** p. 28.
**Upper air data and special synoptic observations,** p. 29.
Evans, G. J.: **Meteorology with marine applications by W. L. Donn,** p. 29.

**Meteorological Magazine,** London, Volume 81, Number 956, February 1952.

Lamb, H. H.: **South Polar atmospheric circulation and the nourishment of the antarctic ice-cap,** p. 33–42.
James, R. W.: **Physical significance of mean flow charts,** p. 42–48.
*Letters to the Editor*
Ward, R.: **Rain from non-freezing cloud,** p. 56.
Gold, E.: **Lag of wet-bulb thermometer during rising temperature after frost,** p. 57.
*Notes and News*
**Lenticular lee-wave cloud over New Zealand,** p. 57.
**Angle of deviation between the winds at 50 ft. and 2,000 ft. over the North Atlantic Ocean,** p. 59.

**Meteorologische Rundschau,** Volume 4, Number 7/8, July/August 1951.

Essenwanger, Oskar: **Über Luftdruckwellen von 13 bis 18 Tagen Dauer in Mitteleuropa,** [On pressure waves of 13–18 days length in Central Europe], p. 129–130.
Weinländer, A.: **Meteorologische Erscheinungen beim Stadtbrande Münchens,** [Meteorological phenomena accompanying the Munich city fire], p. 132–135.
Schwerdtfeger, Werner: **Ein kleiner Beitrag zur Kenntnis der aerologischen Verhältnisse über dem südlichen Patagonien,** [A small contribution to the knowledge of the aerological conditions over southern Patagonia], p. 135–138.
Kölzer, Joseph: **Über den Stand der Frage des Schalltransportes auf weite Entfernungen,** [On the position of the problem of sound transmission over long distances], p. 138–141.
Kaempfert, Wolfgang: **Ein Phasendiagramm der Besonnung,** [Phase diagram for insolation], p. 141–144.
Bleibaum, Irma: **Messungen des Ultravioletts der Sonnenstrahlung mit dem U.V.-Dosimeter der I. G. Farbwerke-Ludwigshafen in verschiedenen Höhenlagen Thüringens ohne Benutzung der dem Instrument beigegebenen Intensitätsstabellen,** [Measurements of UV solar radiation with the UV dosimeter of the I. G. Farbwerke, Ludwigshafen, at different heights in Thuringia without using the intensity tables accompanying the instrument], p. 144–146.
Aniol, R.: **Über die Temperatur bei fallendem Niederschlag,** [On the temperature with falling precipitation], p. 147–149.
Menzl, Oswald: **Die Schneeverhältnisse auf dem Donnersberg,** [Snow conditions on the Donnersberg], p. 149–151.
Hitzfeld, Otto J. G.: **Halo-Erscheinung,** [Halo phenomenon], p. 151–152.
Gurlitt, Dietrich: **Gleichzeitig acht Halo-Erscheinungen über dem Schwarzwald,** [Eight halo phenomena at once over the Black Forest], p. 152.
Tichy, H.: **Moazagotl oder Motzagotel,** [Moazagotl or Motzagotel], p. 152.

**Meteorologische Rundschau,** Volume 4, Number 9/10, September/October 1951.

Wagemann, Hellmut: **Ergänzungen und Anwendungen der Zyklonentheorie,** [Completion and application of the theory of cyclones], p. 169–172.
Quiring, H.: **Entstehung der Erdatmosphäre,** [Development of the earth's atmosphere, p. 172–175.
Mollwo, Hans: **Temperaturminimum und Taupunkt,** [Temperature minimum and dew point], p. 175–178.
Holm, Karl-Friedrich: **Die Änderung der thermischen Kontinentalität in den Jahren 1911 bis 1930,** [The change of thermal continentality in the years 1911–1930], p. 178–179.
Wehner, Hans: **Ein Beitrag zum Problem der hohen Perlmutterwolken,** [A contribution to the problem of high mother-of-pearl clouds], p. 180–181.
Chappaz, Raymond: **Ein Beispiel für die Bildung einer sekundären Warmfront vor einer Warmfront,** [An example of the development of a secondary warm front in advance of a warm front], p. 181–182.
Grunenberg, J.: **Die meteorologischen Bedingungen für die Überreichweiten auf dem Ultrakurzwellen-Band in Richtung Westen in der Nacht vom 4. zum 5. Juni 1951,** [The meteorological conditions for abnormal range of the ultra-short-wave band from the west on the night of June 4–5, 1951], p. 182–183.

Voigts, Heinrich: **Vergleich der klimatisch-phänologischen Bedingungen des Zwischenfruchtbaues nach Winterroggen in Schleswig-Holstein und in Hessen,** [Comparison of the climatic-phenological conditions of catch-crop fruit cultivation after winter rye in Schleswig-Holstein and Hesse], p. 184.

Troeger, Heinz: **Gleichungen für die Ausdehnung des Haares in Hygrometern,** [Equations for the extension of the hair in hygrometers], p. 185.

Voigts, Heinrich: **Experimentelle Untersuchungen über den Kaltluftfluss in Bodennähe bei verschiedenen Neigungen und verschiedenen Hindernissen,** [Experimental investigations into the flow of cold air near the ground with different slopes and obstacles], p. 185–188.

Georgi, Joh. and Haase, O.: **Ein belüftetes Pyranometer,** [A ventilated pyranometer], p. 188–192.

Faust, Heinrich: **Beobachtung einer Böenwolke von der Seite,** [Sideways observation of a squall cloud], p. 192–193.

Georgi, Joh.: **Prüfung der Solarkonstanten,** [Test of solar constant], p. 193–194.

**Tohoku University, Science Reports, 5th Ser., Geophysics,** Volume 2, Number 3, December 1950.

Kato, Yoshio and Kanno, Tsunekichi: **On the variations of the cosmic-ray intensity associated with the magnetic storm,** p. 153–157.

Ogiwara, Sekiji: **On the solid condensation nucleus which is not soluble in water (Studies on the formation of cloud and rain III),** p. 158–162.

Ouchi, Koo: **On the stability of the ice germs in a cloud (fog) particle,** p. 163–166.

Shiotani, Massao: **Turbulence in the lowest layers of the atmosphere,** p. 166–201.

**Tohoku University, Science Reports, 5th Ser., Geophysics,** Volume 3, Number 1, April 1951.

Nakamura, Saemon Taro: **Meteorological statistics (Part II) secular change in the air temperature,** p. 13–22.

Sato, Takao: **Über die Dämmerungserscheinungen auf der Erde überhaupt,** [On the phenomena of twilight on the earth in general], p. 1–12.

Yamamoto, Giichi and Miura, Akira: **Opacity at Sendai,** p. 23–33.

Yamamoto, Giichi and Miura, Akira: **Saturation vapour pressure and size of condensation nucleus,** p. 34–39.

**Tohoku University, Science Reports, 5th Ser., Geophysics,** Volume 3, Number 2, September 1951.

Kato, Yoshio; Kamiyama, Hiroshi and Kikuchi, Takehiko: **Report on the result of the observation of the signal strength during the partial solar eclipse of Sept. 12, 1950,** p. 53–56.

Kato, Yoshio: **Report of the geophysical party of the solar eclipse expedition of Tohoku University on observation of terrestrial magnetic field at Nemuro, Onagawa and Katsuura,** p. 57–72.

Yamamoto, Giichi and Onishi, Gaishi: **Appendix to our paper on absorption coefficient of water vapour in the far infra-red region,** p. 73–77.

Ogiwara, Sekiji and Okita, Toshiichi: **The size distribution of sea-salt nuclei and its contribution to visibility,** p. 78–86.

Nakamura, Saemon Taro: **Meteorological statistics (Part III) precipitation,** p. 87–96.

Nakamura, Saemon Taro: **On the record of tide gauge in the case of tsunamis (Seismic tidal waves) and flood of river,** p. 97–98.

Nakamura, Saemon Taro and Sima, Hiromu: **A method of deduction of pressure distribution on an internal plane surface from the observed topographical change (Part I),** p. 99–101.

Kato, Yoshio and Tanaka, Toshio: **On a new astatic magnetometer used for measurement of magnetic properties of rocks,** p. 102–106.

Kato, Yoshio and Noritomi, Kazuo: **The thermal variation of the electric conductivity of rocks,** p. 107–109.

**Weather,** Volume 7, No. 2, February, 1952.

Feteris, P. J.: **Detailed observation of thunderstorms,** p. 35–39.

Stirling, R. J.: **Frosts in May,** p. 40.

Mottram, Brian H.: **Thomas Hardy and weather,** p. 41–48.

Bergeron, Tor: **Ways of improving the weather service,** p. 48–49.

Austin, A. R. I.: **Wave clouds over Southern England,** p. 50–53.

Halsted, D. E.: **Introduction of punch card methods into the Australian Meteorological Service.**

**Weatherwise,** Volume 5, No. 1, February, 1952.

Washburn, Bradford: **Mount McKinley weather experiences,** p. 3–7.
Fletcher, R. D. and Sartor, Doyne: **Cirrus,** p. 8–9.
Harlin, Ben W.: **The great Southern glaze storm of 1951,** p. 10–13.
Youle, Clint: **Telecasting the weather,** p. 14–15.
Floyd, P. M., Jr.: **The effect of natural shading on temperature,** p. 16–17.
Ludlum, David M.: **December, 1951, brings winter and summer,** p. 18–20.

**Wetter und Leben,** Volume 3, Number 9/10, November 1951.

Lauscher, Friedrich: **Hundertjahrfeier der Zentralanstalt für Meteorologie und Geodynamik in Wien,** [Centennial of the Central for Meteorology and Geodynamics in Vienna], p. 193–195.
Morawetz, Sieghard: **Zur Variabilität des Klimas am Südostrand der Alpen,** [On the variability of the climate of the southeastern Alps], p. 195–198.
Rosenkranz, F.: **Marillenbau und Frost in Niederösterreich,** [Apricot cultivation and frost in Lower Austria], p. 199–200.
Rosenkranz, F.: **Die Zweitfruchtzeit in Niederösterreich im Lichte der Phänologie und Meteorologie,** [The second crop in Lower Austria in the light of phenology and meteorology], p. 200–203.
Eckel, O.: **Über die interdiurne Veränderlichkeit der Fluss- und Seeoberflächentemperaturen,** [On the interdiurnal variability of river and sea surface temperatures], p. 203–212.
Sauberer, Franz: **Registrierungen der Temperatur der Fliessgewässer,** [Recording of the temperature of flowing waters], p. 213–216.
Dirmhirn, Inge: **Tagesschwankung der Bodentemperatur, Sonnenscheindauer und Bewölkung,** [Daily variation of soil temperature, sunshine duration and cloudiness], p. 216–219.
Dirmhirn, Inge and Sauberer, Franz: **Die Bedeutung der diffusen Himmelsstrahlung im Bauwesen. II. Teil: Abgeschirmter Horizont,** [The significance of diffuse sky radiation for architecture. Pt. II], p. 222–226.

**Zeitschrift für Meteorologie,** Volume 5, Number 12, December 1951.

Schuster, M.: **Psychrometer-Nomogramme,** [Psychrometer nomograms], p. 353–358.
Schmitz, H. P.: **Über die Bewegung des Druck- und Windzentrums atmosphärischer Hoch- und Tiefdruckgebiete,** [On the motion of the pressure and wind centers of atmospheric high and low pressure regions], p. 358–363.
Fanselau, Gerhard: **Gedanken über die technische Durchführung des geomagnetischen Registrierbetriebes,** [Ideas on the technical management of geomagnetic recording], p. 364–373.
Wiese, H.: **Anomalien des täglichen Ganges in Erdmagnetismus und ihr Zusammenhang mit den Windströmungen der tiefen Ionosphäre,** [Anomalies of the diurnal variation of terrestrial magnetism and their relation to the wind currents of the lower ionosphere], p. 373–377.

# PART IV. AUTHOR AND SUBJECT INDEX

In this section will be found reference to the numbers given at the head of each abstract or entry. In Part I each entry begins with the number 3.3–, and in the bibliography on the C mates of Uruguay, Paraguay and Argentina (Part II), each entry begins with the number and letter 3C–. This index is divided into three parts:

Index of Authors | Index of Subjects | Index of Geographical Locations

## INDEX OF AUTHORS


Abbot, Charles Greeley, 3C–182
Absalom, H. W. L., 3.3–5
Ackerman, Paul, 3.3–52
Akademiia Nauk, SSSR. Laboratoriia Aerometodov, 3.3–131
Alisov, B. P., 3C–1
Aliverti, Guiseppina, 3.3–139
American Automobile Association, 3.3–210
American Meteorological Journal, 3C–57
Apia. Observatory, 3.3–36
Arakawa, Hidetoshi, 3.3–112
Argentina. Círculo de Aeronáutica, 3C–134
Argentina. Comisión Nacional de Climatología y Aguas Minerales, 3C–114
Argentina. Dirección de Meteorología, 3C–115, 3C–181, 3C–220
Argentina. Dirección de Meteorología, Geofísica e Hidrología, 3C–116, 3C–117, 3C–149, 3C–214, 3C–218, 3C–219
Argentina. Dirección General de Navegación e Hidrografía, 3C–118
Argentina. Instituto de Suelos y Agrotecnía, 3C–168
Argentina. Ministerio de Marina. Escuela de Aviación Naval, 3C–165
Argentina. Oficina Meteorológica, 3C–67, 3C–119, 3C–154, 3C–156
Argentina. Oficina Meteorológica Nacional, 3C–120
Argentina. Oficio Hidrográfico, 3C–29
Argentina. Secretaría de Aeronáutica de la Nación, 3C–121
Argentina. Servicio Hidrográfico, 3C–122, 3C–123
Argentina. Servicio Meteorológico Nacional, 3C–124 to 3C–128, 3C–203, 3C–216
Argerich, Guillermo, 3C–129
Ashmore, S. E., 3.3–260
Ashton, Edwin George, 3C–2
Asociación Rural del Uruguay, 3C–78, 3C–81
Asunción. Centro de Estudiantes de Ciencias Económicas, 3C–68
"Asunción," Revista Mensual Ilustrada, 3C–66
Azara, Félix de, 3C–30
Banerji, Sundhansu K., 3.3–200
Bannon, J. K., 3.3–153
Barrera V., Humberto, 3C–130
Bartels, Julius, 3.3–11
Bary, E. de, *see* de Bary, E.
Bates, David R., 3.3–140
Bazzano, Hamlet, 3C–111
Bazzari, Carlos A., 3C–131
Beck, F. Xaver, 3.3–9
Belasco, J. E., 3.3–144
Belcher, Donald Jenks, 3.3–207
Belgium. Institut Royal Météorologique, 3.3–3
Benioff, Hugo, 3.3–259
Berg, Hellmut, 3.3–229
Bergeiro, José María, 3C–74 to 3C–81
Berning, Warren W., 3.3–92
Bertoni, Guillermo Tell, 3C–46
Bertoni, Moisés Santiago, 3C–47 to 3C–51
Bider, M., 3.3–184
Bijl, Willem van der, *see* van der Bijl, Willem
Bjerknes, V., 3.3–21
Blanchard, Duncan C., 3.3–197, 3.3–198
Bleeker, Wouter, 3.3–124
Bliss, E. W., 3C–3
Boffi, Jorge Alberto, 3C–4, 3C–132
Bollo, Luis Cincinato, 3C–31
Bonacina, L. C. W., 3.3–182
Bonfils, Constante G., 3C–248
Borch, Joseph E., 3.3–211
Borzacov, V., 3C–171, 3C–192, 3C–193
Bosso, José Alberto, 3C–133
Botley, Cicely M., 3.3–255
Bourgade La Dardye, Emmanuel de, 3C–52
Bowen, Mark E., 3.3–11
Brandejs, Stanisław, 3.3–125
Brazil. Serviço do Meteorología, 3C–24
Brazol, Demetrio, 3C–134
Brezowsky, Helmuth, 3.3–65
Bristor, Charles L., 3.3–120
Brocks, Karl, 3.3–240
Brooks, Charles E. P., 3.3–212
Brown, Geoffrey M., 3.3–137
Bryson, Reid A., 3.3–115
Büdel, Anton, 3.3–2

Buenos Aires. Villa Ortuzar Observatorio, 3C–220
Bürger, Otto, 3C–53
Bull, G. A., 3.3–28
Bullard, E. C., 3.3–220
Burgos, Juan Jacinto, 3C–135, 3C–136, 3C–249
Burkard, Otto, 3.3–93, 3.3–94
Burmeister, Hermann, 3C–137
Bustos Navarrete, Julio, 3C–5

C——, D. A. S., 3C–138
Cagliolo, Alberto, 3C–139, 3C–249
Caldenius, Carl Carlzon, 3C–140, 3C–141
Campbell, Daniel, 3C–54
Canosa, Ada S. de, 3C–142
Capitanelli, Ricardo G., 3C–143
Cappel, Albert, 3.3–114
Carbonell y Migal, Arturo, 3C–6
Caroli, Günther, 3.3–71
Carrigen, Ralph S., 3.3–211
Cawkwell, George E., 3.3–48
Ceppi, Héctor, 3C–144
Červený, Jaroslav, 3.3–177
Chackett, K. F., 3.3–83
Chavanne, Josef, 3C–145
Chaves, Manuel Wencesleo, 3C–55
Chester, J., 3.3–191
Chicago. University. Dept. of Meteorology, 3.3–97
Chiodi, Hugo, 3C–184
Christison, David, 3C–82
Clarkson, L. S., 3.3–90
Clayton, Frances L., 3C–56
Clayton, Henry Helm, 3C–7, 3C–56, 3C–146, 3C–147, 3C–156
Collins, Joyce A., 3C–252
Collomon, H. J., 3.3–132
Colman, Lerner M., 3C–148
Colqui, Benito S., 3C–250
Columbia University. Lamont Geological Observatory, 3.3–259
Conrad, Victor A., 3.3–25
Contract AF 19(122)-160, 3.3–97
Contract AF 19(122)-238, 3.3–54
Contract AF 19(122)-441, 3.3–259
Contract AF 19(122)-436, 3.3–259
Contract DA 36-039-sc-125, 3.3–42
Contract W 28-099ac-439, 3.3–154
Coombs, D. H., 3.3–177
Corte, A. E., 3C–150
Coyle, J. R., 3C–32, 3C–33
Craddock, J. M., 3.3–51
Craig, Richard A., 3.3–150
Cross, William E., 3C–151
Cuykendall, T. R., 3.3–207
Czepa, O., 3.3–136
Czerniewicz, Mieszysław, 3C–28

Daireaux, E., 3C–137
Davis, Walter Gould, 3C–119, 3C–153 to 3C–156
Davis, William Morris, 3C–152
Deasy, George F., 3C–157
de Bary, E., 3.3–148
Decoud, Hectór Francisco, 3C–58
Decoud, José Segundo, 3C–59
Dedebant, G., 3C–251
Defant, Friedrich, 3.3–106
De Fina, Armando Leopoldo, 3C–158, 3C–159
de la Cruz, A. Conceição, 3C–160
De Le Vin, Margaret Morris (Welch), 3C–8
Delver, A., 3.3–122, 3.3–124
Denney, Roy D., 3.3–211
Dewar, D., 3.3–87
Díaz, Emilio Luis, 3C–118, 3C–161 to 3C–165
Di Corleto, Carmelo, 3C–171
Dimitri, Milán Jorge, 3C–166

Ecuador. Servicio Meteorológico, 3.3–37
Edinger, James G., 3.3–154
Effenberger, Ernst, 3.3–82
Eldridge, R. H., 3.3–162
Elliott, Robert D., 3.3–73
Ellison, M. A., 3.3–141
Endo, Jiro, 3.3–213
Evans, W., 3.3–185
Ewing, Maurice, 3.3–259

Falconer, Raymond E., 3.3–252
Fàntoli, Amilcare, 3C–169
Fariña Sánchez, Teófilo, 3C–60
Faust, Heinrich, 3.3–98
Feĭgel'son, E. M., 3.3–130
Fernley Meteorological Observatory, Southport, 3.3–38
Fischer, Alfons, 3.3–13
Flohn, Hermann, 3.3–15, 3.3–107, 3.3–108, 3C–235
Förchtgott, Jiří, 3.3–84
Foitzik, Leonhard, 3.3–238
Font Tullot, Inocencio, 3.3–234
Forrest, J. S., 3.3–12
France. Service Hydrographique de la Marine, 3C–34, 3C–170
Franze, Bruno, 3C–9, 3C–10
Friggens, Paul, 3.3–74
Frith, Ronald, 3.3–180
Fritz, Sigmund, 3.3–91
Fujita, T., 3.3–29

Gaertner, H., 3.3–138
Gallardo, Medardo, 3C–235
Galmarini, Alfredo, 3C–171
García, María Teresa Ugarteche de, 3C–253
Geiger, Rudolf, 3C–18
Geise, Josef, 3C–172
Gellert, J. F., 3.3–189
Georgi, Johannes, 3.3–16, 3.3–43
Georgii, Walter, 3C–173, 3C–174
Germany. Meteorologisches Amt für Nordwestdeutschland, 3.3–6, 3.3–39
Germany. Oberkommando der Kriegsmarine, 3C–35
Gherzi, Ernest, 3.3–69
Gibson, C. R., 3.3–221
Gillman, M. C., 3.3–179
Gleissberg, W., 3.3–261, 3.3–262
Godoli, G., 3.3–265
Godson, Warren L., 3.3–61

Goethe, S. P., 3.3–168, 3.3–169
Gómez Omil, Dolores, 3C–175
Gooze, Charles, 3C–11
Gorczyński, Władysław, 3.3–222
Gould, Benjamin Apthorp, 3C–119
Grant, D. R., 3.3–180
Gray, L. A., 3.3–166
Great Britain. Hydrographic Office, 3C–36
Great Britain. Meteorological Office, 3.3–7, 3.3–55, 3.3–143, 3.3–183, 3C–12, 3C–13
Gregor, Alois, 3.3–66
Groen, P., 3.3–17
Giuffra, Elzear Santiago, 3C–14
Guiñazú, José Román, 3C–176
Gurlitt, Dietrich, 3.3–243
Guss, Hans, 3.3–26

Hafstad, Katharine C., 3C–40
Hambálek, Josef, 3.3–159
Hann, Julius, 3C–83, 3C–177
Hardy, J. K., 3.3–177
Hare, F. Kenneth, 3.3–223
Hariharan, D. S., 3.3–167
Hartley, G. E. W., 3.3–47
Hashimoto, M., 3.3–99
Hatakeyama, H., 3.3–253
Haude, Waldemar, 3.3–166
Heitz, W., 3.3–40
Hemel en Dampkring, 3.3–256
Hennessy, J., 3.3–18, 3C–178
Hess, Victor F., 3.3–254
Hesse, Walter, 3.3–19, 3.3–233
Hesselberg, Th., 3.3–100
Hessling, N. A., 3C–179, 3C–180
Hicken, Cristóbal M., 3C–196
Hill, E. C. Clear, 3.3–181
Hinkelmann, Karl, 3.3–62
Hinzpeter, Max, 3.3–46
Hitzfeld, Otto J. G., 3.3–245
Hoefer, A., 3C–37
Hofmann, Alfred, 3.3–67
Hollmann, Günther, 3.3–56
Holzapfel, Rupert, 3.3–147
Houghton, H. G., (*chair.*), 3.3–1
Hovmöller, Ernest, 3.3–224
Hoxmark, Guillermo, 3C–181, 3C–182
Hubert, W. E., 3.3–171
Hueck, K., 3C–188

Ibberson, L. A., 3.3–191
Imrie, B. H., 3.3–146
Inoue, E., 3.3–157, 3.3–158
International Bureau of the American Republics, 3C–59
International Congress on Alpine Meteorology, 3.3–224
International Meteorological Committee, 3C–13
International Union of Geodesy and Geophysics, 3.3–5
Israël, Hans, 3.3–250
Izzo, Roque A., 3C–184

Jackson, G. C., 3.3–192
Jaeger, J. C., 3.3–267
Jagsich, Juan, 3C–84, 3C–185 to 3C–187
Jaureguy, Miguel A., 3C–85
Jefferson, Mark, 3C–15, 3C–18
Jenista, Charles O., 3.3–211
Job, M. M., 3C–226
Johansson, Oscar Vilhelm, 3C–16
Johnson, William M., 3.3–211
Jones, Clarence F., 3C–11
Jordan, Placido, 3.3–101
Journal of Glaciology, 3.3–176

Kaerger, Karl, 3C–38
Kanter, Helmuth, 3C–39
Karský, Vladimir, 3.3–142
Kasemir, H. W., 3.3–250
Keidel, Juan, 3C–188
Kejla, Jaroslav, 3.3–27
Kendrew, Wilfrid George, 3C–17
Kertz, Walter, 3.3–102
Khromov, S. P., 3.3–208
Kidd, G. C. H., 3.3–178
Kiral, A., 3.3–262
Klassen, Wilhelm, 3C–61
Kleinschmidt, Ernst, jun., 3.3–117
Knighting, E., 3.3–28, 3.3–191
Knoch, Karl, 3C–18
Knoche, Walter, 3C–62, 3C–171, 3C–189 to 3C–193
Kölzer, Joseph, 3.3–216
Köppen, Wladimir, 3C–18, 3C–194
Koppe, Heinrich, 3.3–236
Koschmieder, Harald, 3.3–126
Kraght, Peter E., 3.3–70
Krečmer, Vladimír, 3.3–231
Krinov, E. L., 3.3–131
Kühn, Franz, 3C–195 to 3C–198
Kuhrt, Friedrich, 3.3–172
Kuznetsov, E. S., 3.3–133

Lacy, R. E., 3.3–34
Lagarmilla, Roberto E., 3C–86
Lamarthée, Julio F., 3C–87
Lamoureux, C. E., 3C–40
Landon, F. A., 3.3–191
Landt, E., 3.3–151
Langmuir, Irving, 3.3–75 to 3.3–77
Lauter, Ernst August, 3.3–95
Ledesma, Néstor René, 3C–199, 3C–200
Lehnert, R., 3.3–151
Leopold, Luna B., 3.3–217
Levert, C., 3.3–193
Lewis, William, 3.3–78
Lilley, G. G., 3.3–177
Lillo, Miguel, 3C–201
Lingelbach, Ernst, 3.3–24
Liu, En-lan, 3.3–190
Liu, Kwang-nan, 3.3–118
Long, Robert R., 3.3–97
Lossnitzer, H., 3.3–227, 3.3–242
Ludlam, F. H., 3.3–173
Lugeon, Jean, 3.3–52

MacDonald, Roderick Hugh, 3.3–203
McDonough, Elvin, 3C–40

McIntyre, D. P., 3.3–103
McKean, D. C., 3.3–132
Maede, Hans, 3.3–235
Malone, Thomas F., 3.3–1
Malysheva, A. E., 3.3–228
Mangels, H., 3C–63, 3C–64
Marchetti, Adolfo A., 3C–202
Marenzi, Augustín D., 3C–184
Marine Observer, 3.3–246
Markowitz, William, 3.3–264
Marlow, Douglas, 3.3–45
Marshall, W. A. L., 3.3–8
Mason, B. J., 3.3–79, 3.3–173
Matthews, H. A., 3C–10, 3C–18
Maurstad, Alf, 3C–171
Meinel, A. B., 3.3–258
Mendoza, Argentina. Universidad de Cuyo, Boletín de Estudios Geográficos, 3C–221
Meteorological Magazine, London, 3.3–4, 3.3–20, 3.3–163, 3.3–175, 3.3–205, 3.3–244
Meteoros, 3C–203, 3C–234
Michigan. University. Engineering Research Institute, 3.3–42
Mieghem, Jacques Van, *see* Van Mieghem, Jacques
Migone, Luis E., 3C–65
Miller, Keith W., 3.3–211
Möller, Fritz, 3.3–148
Montevideo. Observatorio Nacional, 3C–88
Montevideo. Universidad. Facultad de Agronomía. Estación Experimental de Riego, 3C–89
Morandi, Luis, 3C–90 to 3C–102
Morgan, David A., 3.3–57
Müller, Rolf, 3.3–266
Muguerza, Alberto, 3C–204
Murakami, T., 3.3–109
Murray, William D., 3.3–54

Napp, Richard, 3C–205
Nature, London, 3.3–263
Neuberger, Hans H., 3.3–247
Neumann, J., 3.3–199
New York University. College of Engineering. Research Division, 3.3–54

O'Donnell, George A., 3.3–254
Ogawara, M., 3.3–33
Olascoaga, M. J., 3C–206
Oltman, Roy Edwin, 3.3–202
Ovenden, Michael W., 3.3–237
Ozawa, T., 3.3–33

Panair do Brazil. Meteorological Service, 3C–32, 3C–33
Paneth, F. A., 3.3–83
Pannocchia, G., 3.3–139
Papadakis, Juan, 3C–207
Paraguay. Direccion General de Estadística, 3C–69, 3C–70
Paraguay. Ministerio de Guerra y Marina, 3C–71
Parker, Bertha Morris, 3.3–165
Paton, James, 3.3–257
Paul, William, 3.3–241
Paulsen, Wolfgang, 3.3–232
Pemberton, J. C., 3.3–45
Pérez, Martín, 3C–208
Pérez Fontana, Hispano V., 3C–103
Pérez-Moreau, Román A., 3C–209
Petrovič, Št., 3.3–195
Pierson, Willard J., Jr., 3.3–80
Pitchford, Leslie Lee, Jr., 3C–210
Pollak, Leo Wenzel, 3.3–121
Polunin, Nicholas, 3.3–85
Poser, Hans, 3.3–218
Potter, W. H., 3.3–206
Pramanik, S. K., 3.3–167, 3.3–186
Prescott, J. A., 3C–252
Press, Frank, 3.3–259
Preston, James E., 3C–19
Price, W. C., 3.3–44
Prohaska, Federico J., 3C–211 to 3C–213, 3C–253

Raethjen, Paul, 3.3–110, 3.3–111
Ramamurti, K. S., 3C–20
Range, Paul, 3.3–145
Rao, K. Nagabhushana, 3.3–186
Ratera, Enrique L., 3C–215
Ratisbonna, Leandro, 3C–21, 3C–24
Ravenstein, E. G. (*ed.*) 3C–52
Reasbeck, P., 3.3–83
Reed, Wesley Wharton, 3C–41, 3C–217
Reinhard, H., 3.3–230
Reneuve, Paul, 3.3–14
Reuter, Heinz, 3.3–63
Reynaud, María Antonia (*trans.*), 3C–188
Ribeiro Reissig, Anibal, 3C–104 to 3C–106
Rigby, Malcolm, 3C–22
Righini, G., 3.3–265
Ringuelet, Emilio J., 3C–222, 3C–223
Rivas Rodríguez, Serafín, 3C–72
Robinson, Burton W., 3.3–211
Robitzsch, Max, 3.3–21, 3.3–50, 3.3–88
Rohmeder, Guillermo, 3C–188, 3C–198, 3C–224, 3C–225
Rossmann, Fritz, 3.3–127, 3.3–160
Rotch, A. Lawrence, 3C–42
Roulleau, J., 3.3–58
Roy, M. P. van, *see* van Roy, M. P.
Rudloff, Hans von, *see* von Rudloff, Hans
Rudorf, G., 3C–226
Rühle, Karl, 3C–23
Ryan, Earl F., 3C–235

Sack, H. S., 3.3–207
Samatán, Enrique Luis, 3C–227
San Miguel, Argentina. Instituto de Investigación. Acta Scientifica, 3C–247
San Miguel, Argentina. Observatorio de Física Cósmica, 3C–228
Sandner, Werner, 3.3–248
Santamarina, Estela B., 3C–225
Santini, B., 3C–226
Santos, Modesto C., 3C–249
Sauberer, Adele, 3.3–225
Schamp, Heinz, 3.3–219

Schatz, Heinrich, 3.3–161
Schereschewsky, P., 3C–233
Scherhag, Richard, 3.3–59
Schiffers, Heinrich, 3.3–209
Schiller, Walther, 3C–43
Schmauss, August, 3.3–22
Schmidt, Reinhart C., 3.3–68
Schneider-Carius, Karl, 3.3–89
Schulze, Alfred, 3.3–201
Schumann, Theodor E. W., 3.3–129
Schwerdfeger, Werner, 3.3–152, 3C–229 to 3C–232
Scorer, R. S., 3.3–149
Scully, E. C., 3.3–64
Seiwell, H. R., 3.3–30
Serra, Adalberto Barranjard, 3C–24
Sharp, Robert P., 3.3–204
Shaw, R. H., 3.3–41
Shellard, H. C., 3.3–72, 3.3–180
Shipcott, John G., 3.3–249
Shipman, Robert L., 3C–235
Shirpurkar, G. R., 3C–252
Skinner, Wilfred A., 3.3–211
Smith, L. P., 3.3–35
Smith, Theodore B., 3C–235
Smithsonian Miscellaneous Collections, 3C–7
Sorenson, John L., 3.3–211
Sorge, Ernst, 3C–25
Sparn, Enrique, 3C–236 to 3C–238
Spuhler, Walter S., 3C–235
Stanley, J. P., 3.3–96
Sudriers, Víctor B., 3C–107
Sussini, Miguel, 3C–114
Suter, Karl, 3.3–196
Sutherby, F. S., 3.3–177
Sutton, O. S., 3.3–60
Suzuki, E., 3.3–31
Swinbank, W. C., 3.3–49

Tadeuchi, M., 3.3–128
Taverner, L. E., 3.3–188
Ten Hoopen, K. J., 3.3–215
Tennessee Valley Authority. Hydraulic Data Branch, 3.3–187
Tepper, Morris, 3.3–123
Thams, J. Chr., 3.3–184
Thom, H. C. S., 3.3–41
Thompson, H. W., 3.3–132, 3.3–134
Thornthwaite, Charles Warren, 3.3–170
Tiscornia, José T., 3C–108
Tomatsu, K., 3.3–33
Townsend, A. A., 3.3–155
Tracy, Hubert J., 3.3–202
Troili-Petersson, Gerda, 3C–239
Tschermak, Leo, 3.3–226
Tucumán, Argentina. Universidad Nacional. Museo de Ciencias Naturales, 3C–201

U. S. Air Force. Cambridge Research Center. Geophysics Research Division, 3.3–1
U. S. Air Weather Service, 3C–22, 3C–40
U. S. Department of Agriculture, 3.3–42
U. S. Hydrographic Office, 3C–26
U. S. Weather Bureau, 3.3–123, 3C–22, 3C–40, 3C–41, 3C–217
Uruguay. Dirección General de Estadística, 3C–109
Uruguay. Instituto Meteorológico Nacional, 3C–110, 3C–111
Uruguay. Instituto Nacional Físico-climatológico, 3C–112
Uruguay. Servicio Meteorológico, 3C–113
Utikawa, K., 3.3–253

Vallentin, Wilhelm, 3C–73
Van der Bijl, Willem, 3.3–23
Van Mieghem, Jacques, 3.3–104
Van Roy, M. P., 3.3–129
Vassy, Étienne, 3.3–53
Vassy, Mme. Étienne, 3.3–53
Vieira, Sebastián E., 3C–44
Voigts, Heinrich, 3.3–10, 3.3–156
Vollprecht, R., 3.3–81
von Rudloff, Hans, 3.3–40
Vorel, Čeněk, 3.3–194
Voss, Ernst Ludwig, 3C–27
Vuorela, Lauri A., 3C–45

Ward, A., 3.3–164
Watanabe, T., 3.3–119
Watson, H. H., 3.3–86
Weber, Teodoro F. A., 3C–240
Wegener, Kurt, 3C–241 to 3C–243, 3C–254
Weickmann, Helmut K., 3.3–174
Wells, H. S., 3.3–171
Wempe, J., 3.3–135
Westfold, K. C., 3.3–267
Whale, H. A., 3.3–96
Wiborg, B. S., 3.3–83
Wienert, K., 3.3–250
Wilkes, M. V., 3.3–105
Williams, R. L., 3.3–134
Winter, H., 3.3–214
Wölcken, Kurt, 3C–171, 3C–244, 3C–245
Wolf, Helmut, 3.3–32
Würschmidt, J., 3C–246

Yamamoto, Gi-ichi, 3.3–239
Yeh, Tu-cheng, 3.3–113, 3.3–251
Yriberry, A. J., 3C–247

Zeuner, Frederick E., 3.3–212, 3.3–220
Zych, Stanisław, 3C–28

## INDEX OF SUBJECTS

Ablation, 3.3–204
Acoustical propagation, 3.3–259
Aerial photography, 3.3–131
Aerobiology, 3.3–84, 3.3–85
Aerodynamics, 3.3–151
Aerological studies, 3C–232
Aeronautical climatology, 3C–12, 3C–33, 3C–40
Aeronautical meteorological services, 3C–121

Aeronautical meteorology, 3.3–176, 3C–165
Agricultural climatology, 3.3–189, 3C–47, 3C–78, 3C–81, 3C–133, 3C–139, 3C–158, 3C–192, 3C–207, 3C–226
Agricultural meteorology, 3.3–12, 3.3–13, 3C–50, 3C–108, 3C–157, 3C–166, 3C–186
Agriculture, 3C–38, 3C–125
Agronomy, 3.3–41
Air conditioning, 3.3–168, 3.3–169
Air coupled waves, 3.3–259
Air density, 3.3–88
Air mass characteristics, 3C–211
Air masses, 3C–19, 3C–21, 3C–24, 3C–173, 3C–190
Air sampling and analysis, 3.3–82, 3.3–83
Airplane observations, 3.3–131
Airports, 3C–12
Albedo of clouds, 3.3–130
Albedo of earth, 3.3–131
Anemographs, 3.3–47
Anemometers, 3.3–48
Animal ecology, 3.3–185
Animal husbandry, 3C–108
Annual reports, 3.3–7, 3.3–37, 3.3–38, 3.3–40, 3.3–70, 3C–113, 3C–124
Anticyclogenesis, 3.3–65
Anticyclones, 3C–180
Applied climatology, 3.3–210
Arcetri Astrophysical Observatory, 3.3–265
Aridity zones, 3C–25, 3C–188
Artificial precipitation, 3.3–72, 3.3–73, 3.3–75, 3.3–81, 3C–174, 3C–229
Atmospheric absorption, 3.3–130, 3.3–132, 3.3–134
Atmospheric circulation, 3.3–103, 3.3–106, 3.3–108, 3.3–110, 3.3–111, 3.3–112, 3C–4, 3C–156, 3C–161
Atmospheric composition, 3.3–82, 3.3–83, 3C–239
Atmospheric disturbances, 3.3–115, 3C–231
Atmospheric electricity, 3.3–250
Atmospheric pollution, 3.3–86, 3C–43, 3C–148, 3C–184
Atmospheric pressure, 3.3–150
Atmospheric structure, 3.3–88, 3.3–89, 3.3–147
Atmospheric turbulence, 3.3–157, 3.3–158
Auroral spectra, 3.3–258
Auroras, 3.3–257
Autocorrelations, 3.3–31

Bai-u, 3.3–109
Ball lightning, 3.3–256
Barometer reduction, 3.3–151
Bentley flour pellet technique, 3.3–197
Bibliographies, 3.3–1, 3C–8, 3C–225, 3C–236 to 3C–238
Bioclimatology, 3.3–230, 3C–190
Biography, 3.3–15 to 3.3–22, 3C–210
Bjerknes, Vilhelm F. K., 3.3–17, 3.3–21
Blue moon, 3.3–241
Blue sun, 3.3–241
Buenos Aires—London air route, 3C–32

Calms, 3C–95
Cambridge University. Napier Shaw Library, 3.3–4
Chicago. University. Dept. of Meteorology, 3.3–103
Cirrus clouds, 3.3–181
City planning, 3C–148
Climatic changes, 3.3–212, 3.3–216, 3.3–217, 3.3–220, 3C–140, 3C–188, 3C–194
Climatic classification, 3.3–222, 3.3–223, 3C–136, 3C–137, 3C–171, 3C–192, 3C–193
Climatic data, 3.3–38 to 3.3–40, 3.3–210, 3C–7, 3C–13, 3C–26, 3C–34 to 3C–36, 3C–40, 3C–41, 3C–46, 3C–56, 3C–63, 3C–64, 3C–67, 3C–70, 3C–92, 3C–101, 3C–103, 3C–109 to 3C–113, 3C–116, 3C–119, 3C–120, 3C–124, 3C–125, 3C–128, 3C–138, 3C–154, 3C–155, 3C–228
Climatic effects, 3C–22
Climatic forecasting, 3C–118
Climatic influences, 3C–160
Climatic normals, 3C–98, 3C–101
Climatic regions, 3C–1, 3C–2, 3C–145, 3C–154, 3C–169, 3C–175, 3C–195, 3C–207
Climatic trends, 3.3–213
Climatic variations, 3.3–202, 3.3–214, 3.3–215, 3C–193, 3C–213
Climatic wind roses, 3C–211
Climatic zones, 3.3–221, 3C–80
Climatological fads, 3.3–208
Climatological prediction, 3.3–34
Climatology, 3C–1 to 3C–254
Climatotherapy, 3C–85
Clothing climate, 3.3–228
Cloud data, 3C–22
Cloud dissolution, 3.3–174
Cloud formation, 3.3–179, 3.3–181
Cloud heights, 3.3–178
Cloud photographs, 3.3–76, 3.3–77, 3.3–179, 3.3–180
Cloud physics, 3.3–173
Cloud seeding, 3.3–72, 3.3–77, 3.3–80
Cloud types, 3.3–115
Clouds, 3.3–182, 3C–62
Cold fronts, 3.3–128, 3.3–144
Cold poles, 3.3–108, 3C–5
Compendium of Meteorology, 3.3–1
Computation tables, 3C–227
Condensation nuclei, 3.3–78, 3.3–172
Conferences, 3.3–5, 3.3–13
Convection, 3.3–99
Cooling power, 3.3–228
Correlations, 3.3–29, 3.3–32, 3.3–114; 3C–3, 3C–179, 3C–251
Cotton, 3C–151
Cumulonimbus clouds, 3.3–178
Cyclogenesis, 3.3–118
Cyclone dynamics, 3.3–119
Cyclone structure, 3.3–117
Cyclone tracks, 3.3–235

D layer, 3.3–95
Daily weather maps, 3C–126
Definitions, 3.3–55, 3.3–264, 3C–86
Delcambre, E., 3.3–20

Dendrochronology, 3.3–220
Depressions, 3.3–121, 3C–180
Dew point, 3.3–167
Dew point tables, 3C–227
Differential kinematics, 3.3–98
Disperse systems, 3.3–84
Diurnal pressure variations, 3C–254
Diurnal temperature variations, 3C–15
DOVAP instrumentation, 3.3–92
Drop size distribution, 3.3–238
Drosometers, 3.3–51
Drought, 3.3–194, 3C–106, 3C–107, 3C–149, 3C–176
Drought frequencies, 3C–108
Dry ice, 3.3–72
Dust, 3.3–233
Dust devils, 3.3–126
Dust storms, 3.3–164, 3C–244
Dutch language, 3.3–3
Dynamic climatology, 3.3–107
Dynamics of the atmosphere, 3.3–98, 3C–247

Earth currents, 3.3–227
Earthquakes, 3.3–259
Eddy diffusion, 3.3–154
Electrical conductivity of air, 3.3–254
Energy equations, 3.3–133
Energy transport, 3.3–100
Evapotranspiration, 3.3–170, 3C–136
Exhibitions, 3.3–8
Expeditionary data, 3.3–248
Expeditions, 3.3–16
Extended forecasting, 3.3–59, 3.3–114, 3C–146, 3C–147, 3C–182
Extinction coefficients, 3.3–135
Extreme temperatures, 3.3–144

F2 layer, 3.3–94
Fires, 3.3–81
Föhn development, 3.3–160
Föhn effects, 3.3–159
Föhn storms, 3.3–161
Föhn winds, 3C–152
Fog frequencies, 3C–94
Fog intensity, 3C–94
Forecast errors, 3.3–71
Forecast verification, 3C–115
Forest fires, 3.3–14, 3.3–86
Forest influences, 3.3–231, 3.3–232
Forest limits, 3C–183
Forestry, 3.3–226, 3C–176
Fragmentary climatic data, 3C–138, 3C–225
Freezing temperatures, 3.3–144
French language, 3.3–3
Frequency distributions, 3.3–26, 3.3–28
Frontal analysis, 3.3–61
Fronts, 3.3–64, 3.3–89, 3.3–129, 3.3–252, 3C–19
Frost, 3C–159, 3C–215
Frost forecasting, 3C–186
Frost free periods, 3C–157
Frost frequencies, 3C–249

Gales, 3C–44, 3C–99
Gburek, Leo, 3.3–19
General circulation, 3C–14, 3C–132
General circulation forecasting, 3C–163
General meteorology, 3.3–1
Geochronology, 3C–141
Geography, 3C–142, 3C–175, 3C–196, 3C–225
Geological climates, 3.3–211, 3C–194
Geophysical time series, 3.3–25, 3.3–30
Glacial periods, 3.3–217, 3.3–219
Glossaries, 3.3–3
Gould, Benjamin Apthorp, 3C–210
Graphical presentation, 3C–9, 3C–134
Great Britain. Meteorological Office, 3.3–7
Ground water, 3C–250
Group wave velocity, 3.3–96
Growing season, 3C–157

Haboobs, 3.3–163
Hail, 3C–93
Hail damage, 3C–143
Hail distribution, 3C–76, 3C–97, 3C–181
Hail formation, 3.3–173
Hail observation techniques, 3C–90
Hail size distribution, 3C–76
Hail structure, 3C–97
Hailstorms, 3C–191
Halo observation, 3.3–243 to 3.3–246, 3.3–248
Halos, 3.3–247, 3.3–249
Harmonic analysis, 3.3–11
Haze, 3.3–135, 3.3–238
Heat balance, 3.3–148
Heat waves, 3.3–234
Heating and ventilating, 3.3–34
Height computation, 3.3–151
History of meteorology, 3C–167, 3C–210, 3C–234
Hobbs, William Herbert, 3.3–16
Horticulture, 3C–199, 3C–200, 3C–204
Hot wire anemometers, 3.3–49
Humidity balance, 3.3–148
Humidity measurement, 3.3–168, 3.3–169
Hurricane forecasting, 3.3–69
Hydrodynamics, 3.3–97, 3.3–103
Hydrologic cycle, 3.3–166, 3.3–170, 3.3–201
Hydrology, 3.3–202, 3C–150
Hydrometeorology, 3.3–186, 3C–188
Hydrometeors, 3.3–165, 3C–130
Hygrometry, 3.3–50

Ice crystal concentration, 3.3–171
Ice crystal formation, 3.3–174
Icing, 3.3–176
Icing forecasting, 3.3–177
Icing of aircraft, 3.3–177
Icing prevention, 3.3–176
Infrared radiation, 3.3–138
Ionization densities, 3.3–92
Ionosphere, 3.3–93, 3.3–94, 3.3–96, 3.3–140
Ionospheric disturbances, 3.3–91
Ionospheric records, 3.3–92
Ionospheric structure, 3.3–92

James energy ratio, 3.3–57
Jameson, Harold, 3.3–18
Jet stream, 3.3–106, 3.3–109, 3.3–112

Katabatic winds, 3.3–162
Krick, Irving P., 3.3–74

Lee waves, 3.3–84, 3.3–149
Lichens, 3.3–225
Lidster, George A., 3.3–38
Light of the night sky, 3.3–45, 3.3–137, 3.3–258
Lightning, 3.3–255, 3C–189
Line squalls, 3C–178
Long period records, 3.3–142, 3.3–183, 3C–49, 3C–53, 3C–60, 3C–96, 3C–98, 3C–99, 3C–105, 3C–107, 3C–116, 3C–201, 3C–212, 3C–219
Long range forecasting, 3.3–66, 3C–3, 3C–84, 3C–179, 3C–180
Luminescent clouds, 3.3–257
Lunar tides, 3.3–11
Lysimeters, 3.3–51

Marine climatology, 3C–26, 3C–29, 3C–34, 3C–35, 3C–122, 3C–123
Marine forecasting, 3.3–55
Marine influences, 3C–77
Marine meteorology, 3C–123
Mathematical forecasting, 3.3–24, 3.3–56, 3.3–60, 3.3–62, 3.3–63
Maximum possible precipitation, 3.3–167
Mechanics of the atmosphere, 3.3–97
Medical climatology, 3.3–227, 3.3–229
Meridional circulation, 3.3–90, 3.3–101
Meteorological elements, 3.3–12, 3.3–14
Meteorological observations, 3.3–37
Meteorological observatories, 3C–112
Meteorological research, 3.3–58
Meteorological services, 3.3–6, 3C–42, 3C–87, 3C–115, 3C–210, 3C–228, 3C–234
Meteorological stations, 3C–100, 3C–216
Meteorological trends, 3.3–27
Meteorology, 3.3–1, 3.3–4, 3.3–8, 3C–203
Meteors, 3.3–237
Microclimatology, 3C–139
Micrometeorology, 3.3–126
Minimum temperatures, 3.3–143
Monsoon circulation, 3.3–156
Montevideo–Santiago air route, 3C–12
Monthly summaries, 3C–128
Mountain and valley winds, 3.3–242
Mountain meteorology, 3.3–224, 3.3–250, 3C–177, 3C–197, 3C–233
Mountain observations, 3.3–195, 3C–233
Myths, 3.3–255

*n*-method, 3.3–229
Nitrogen compounds, 3.3–132, 3.3–134
Nocturnal cooling, 3.3–136
Nomograms, 3.3–46, 3.3–88, 3C–117, 3C–219
*Normal period* (1901–1930), 3.3–142
Nosography, 3C–46, 3C–65
Nuclei count, 3.3–171

Objective forecasting, 3.3–68, 3C–118
Observational data, 3.3–36, 3.3–39, 3C–54, 3C–66, 3C–67, 3C–88, 3C–94, 3C–120, 3C–126, 3C–127, 3C–168, 3C–198
Observational errors, 3.3–35
Observatories, 3C–216
Observers manuals, 3.3–55
Ocean currents, 3C–84
Oceanic influences, 3C–186
Oceanographic research, 3C–77
Optical phenomena, 3C–86
Oranges, 3C–166
Orographic effects, 3.3–152, 3.3–159, 3C–4, 3C–21, 3C–132, 3C–202
Orographic influences, 3.3–128, 3.3–221, 3.3–253
Ozone layer measurement, 3.3–53
Ozone measurement, 3.3–54
Ozone meters, 3.3–53, 3.3–54
Ozone variations, 3.3–91, 3.3–139

Paleoclimates, 3.3–220
Pamperos, 3C–37, 3C–82, 3C–178
Parhelia observation, 3.3–248
Periodicals, 3C–203
Periodicities, 3.3–30, 3.3–31, 3.3–94, 3C–49, 3C–84
Periodogram analysis, 3.3–25, 3C–162
Phenology, 3.3–41, 3C–125, 3C–158, 3C–200, 3C–204
Photometers, 3.3–45
Physiological climatology, 3.3–228
Pilot balloon data, 3C–88, 3C–220
Pilot balloons, 3.3–191
Pilot guides, 3C–26, 3C–29, 3C–34, 3C–36, 3C–122, 3C–123, 3C–125
Planetary circulation, 3.3–110
Plant ecology, 3.3–225, 3.3–226, 3.3–230, 3C–23, 3C–62, 3C–125, 3C–222
Polar fronts, 3.3–111
Polar migration, 3C–194
Popular meteorology, 3.3–2, 3.3–66
Potato blight, 3C–139
Potatoes, 3C–215
Potential gradient, 3C–247
Potential gradient variations, 3.3–251, 3.3–253
Precipitation, 3.3–183, 3.3–202, 3C–27, 3C–48, 3C–49, 3C–129, 3C–171
Precipitation calculation, 3C–209
Precipitation data, 3C–10, 3C–36, 3C–59, 3C–60, 3C–73, 3C–102, 3C–106, 3C–149, 3C–172, 3C–175, 3C–201, 3C–217, 3C–221
Precipitation distribution, 3.3–70, 3.3–235, 3C–10, 3C–172, 3C–206
Precipitation forecasting, 3.3–68, 3.3–70, 3C–164
Precipitation mechanism, 3.3–79
Precipitation normals, 3C–51
Precipitation regime, 3C–21
Precipitation variations, 3.3–184, 3.3–189, 3.3–196, 3C–202
Pressure distribution, 3.3–218
Pressure oscillations, 3.3–102, 3.3–105
Pressure variations, 3.3–119, 3.3–236, 3C–20
Pressure waves, 3.3–152
Probability theory, 3.3–33
Progress in meteorology, 3.3–1
Public health, 3C–148
Pyrheliometers, 3.3–43

Quarternary climates, 3.3–217, 3C–140, 3C–141

Radio noise bursts, 3.3–141
Radio waves, 3.3–96
Radioactive measuring device, 3.3–207
Radiosonde ascents, 3.3–98
Radiosonde calibration, 3.3–46
Radiosonde errors, 3.3–52
Rain gages, 3.3–195
Rain intensities, 3.3–199
Raindrop coalescence, 3.3–173
Raindrop size distribution, 3.3–197 to 3.3–199
Rainfall, 3C–63, 3C–71, 3C–89, 3C–93, 3C–145, 3C–151, 3C–162
Rainfall data, 3.3–186
Rainfall distribution, 3.3–185, 3.3–187, 3C–11, 3C–183
Rainfall effects, 3.3–191
Rainfall extremes, 3.3–192, 3.3–193
Rainfall frequencies, 3C–81
Rainfall normals, 3C–75, 3C–219
Rainfall variations, 3.3–188, 3.3–190, 3C–229
Rainwater scoop measurement, 3.3–77
Refraction of light, 3.3–240
Relative topography, 3.3–98
Réseau Mondial, 3C–13
Reviews, 3.3–212
Rime, 3.3–175
River stages, 3.3–205
Rocket observation, 3.3–42
Rossby, Carl-Gustav, 3.3–103
Rotating spherical shells, 3.3–97
Runoff, 3.3–202, 3.3–203, 3.3–206, 3.3–231, 3C–107

Sand dune formation, 3.3–218
Scattering of light, 3.3–133
Sea ice formation, 3C–212
Seasonal rainfall distribution, 3C–80
Seasonal precipitation distribution, 3C–104
Seasonal temperature distribution, 3C–80
Severe winters, 3.3–145
Silver iodide, 3.3–73, 3.3–74, 3.3–80
Sirocco, 3C–152
Sky brightness, 3.3–133
Skylight color, 3C–86
Smoke, 3.3–86
Smoke pall—Sept. 1950, 3.3–241
Snow, 3.3–196
Snow crystal formation, 3.3–173
Snow melt, 3.3–200
Snow studies, 3C–144
Snowstorms, 3.3–120
Soap bubble releases, 3.3–154
Soil conservation, 3C–168
Soil erosion, 3.3–231
Soil moisture, 3.3–166
Soil moisture measurement, 3.3–207
Soil temperatures, 3.3–166
Soils, 3.3–230, 3C–160
Solar activity, 3.3–264
Solar constant, 3C–242
Solar flares, 3.3–141, 3.3–266
Solar influences, 3.3–150, 3.3–229, 3.3–236
Solar radiation, 3C–146, 3C–147, 3C–161, 3C–241, 3C–243
Sooted screen technique, 3.3–198
Special winds, 3C–152, 3C–153
Spectrophotometry, 3.3–131
Statistical analysis, 3.3–30
Statistical forecasting, 3.3–33, 3.3–67, 3C–251
Statistical studies, 3.3–129
Statistical techniques, 3.3–23, 3.3–26 to 3.3–28
Steering, 3.3–65
Storm rainfall, 3.3–186
Stratosphere, 3.3–83, 3.3–87, 3.3–90
Stratus clouds, 3.3–130
Structure of disturbances, 3C–235
Süring, Reinhard, 3.3–15
Sun's corona, 3.3–237, 3.3–267
Sunspot cycles, 3.3–121, 3.3–261
Sunspots, 3.3–262, 3.3–265, 3C–147
Synoptic analysis, 3.3–69, 3C–14, 3C–33, 3C–45, 3C–244
Synoptic charts, 3C–126
Synoptic climatology, 3.3–234, 3.3–235
Synoptic forecasting, 3.3–64, 3C–235
Synoptic meteorology, 3C–165
Synoptic studies, 3C–33

Tables, 3.3–130
Teaching of meteorology, 3.3–9, 3.3–10, 3.3–165
Temperature, 3C–89, 3C–145
Temperature data, 3C–59, 3C–71, 3C–73, 3C–102, 3C–197, 3C–201, 3C–246
Temperature effects, 3C–47, 3C–50, 3C–199
Temperature extremes, 3C–5
Temperature forecasting, 3C–230
Temperature frequencies, 3.3–144, 3C–81
Temperature inversions, 3.3–146
Temperature normals, 3.3–142, 3C–75
Temperature regime, 3C–9, 3C–16
Temperature variations, 3C–28, 3C–105, 3C–245
Terrestrial magnetism, 3.3–11
Terrestrial radiation, 3.3–136
Textbooks, 3C–158, 3C–166
Thermodynamics of the atmosphere, 3.3–105, 3.3–106
Thermometers, 3.3–35
Thornthwaite's classification, 3.3–221, 3C–160
Thunder, 3.3–260
Tornado and Severe Storm Project, 3.3–123
Tornado dynamics, 3.3–125, 3.3–127
Tornado formation, 3.3–125
Tornado research, 3.3–123
Tornadoes, 3.3–122, 3.3–126
Transmission lines, 3.3–12
Tropical cyclones, 3.3–116
Tropical meteorology, 3.3–170, 3C–45
Tropical squalls, 3.3–116
Tropopause, 3.3–90, 3.3–117
Tropopause height, 3.3–87, 3.3–112
Troposphere, 3.3–108, 3.3–110
Turbidity, 3.3–242
Turbulence, 3.3–100, 3.3–106, 3.3–153, 3.3–154,
Turbulence theory, 3.3–104, 3.3–155
Twilight duration, 3C–117
Typhoon forecasting, 3.3–57

Ultraviolet light, 3.3–139
Ultraviolet radiation, 3.3–44
Upper air sampling, 3.3–42
Upper air temperatures, 3.3–140, 3.3–147
Upper air wind data, 3C–232
Upper air winds, 3.3–153, 3C–32

Vapor pressure, 3.3–172
Vapor pressure measurement, 3.3–49
Vegetation, 3C–160
Vertical temperature gradient, 3C–253
Viscosity, 3.3–155
Visibility, 3.3–26, 3.3–238, 3.3–239, 3C–127
Visibility data, 3C–22
Viticulture, 3C–143
Volcanic dust, 3C–43
Vorticity, 3.3–111
Vorticity equations, 3.3–56, 3.3–113
Vorticity theory, 3.3–101

Water supply, 3.3–200
Watersheds, 3.3–206
Wave mechanics, 3.3–149
Waves in the westerlies, 3.3–63
Weather, 3.3–171
Weather control, 3.3–176
Weather forecasting, 3.3–58, 3C–79, 3C–214
Weather lore, 3C–79
Wegener, Alfred, 3.3–22
Wind data, 3C–91, 3C–95
Wind effects, 3.3–218
Wind erosion, 3C–168, 3C–240
Wind frequencies, 3C–95
Wind inclinometers, 3.3–47
Wind profiles, 3.3–106
Wind structure, 3.3–157, 3.3–158
Wind variations, 3C–91
Wind waves, 3.3–30
Whirlwinds, 3.3–124, 3.3–126
World weather records, 3C–7, 3C–13, 3C–56

Yearbooks, 3.3–36, 3.3–39

Zonal circulation, 3.3–95, 3.3–113
Zonda, 3C–152, 3C–153, 3C–187

## INDEX OF GEOGRAPHICAL LOCATIONS

Alberta, Canada, 3.3–86
Andes, 3.3–152, 3C–197, 3C–233
Antarctic, 3.3–108, 3.3–248
Apia, Western Samoa, 3.3–36
Arctic, 3.3–85, 3.3–108
Arctic Ocean, 3C–239
Argentina, 3C–35, 3C–36, 3C–39, 3C–42, 3C–115 to 3C–254
Asunción, Paraguay, 3C–46, 3C–56, 3C–60, 3C–66, 3C–67, 3C–70, 3C–73
Atlantic Ocean, 3C–45, 3C–239
Australia, 3C–252

Baden, Germany, 3.3–40
Balde, Argentina, 3C–208
Belgian Congo, 3.3–170
Berlin, Germany, 3.3–145, 3.3–244
Beskids, Czechoslovakia, 3.3–159
Black Forest, Germany, 3.3–242, 3.3–243
Brazil, 3C–62
Breconshire, Wales, 3.3–185
Buenos Aires, Argentina, 3C–131, 3C–138, 3C–147, 3C–159, 3C–164, 3C–184, 3C–211, 3C–220, 3C–226, 3C–244

California, 3.3–154, 3.3–259
Canada, 3.3–86
Canary Islands, 3.3–234
Carmen de Patagones, Argentina, 3C–133
Central America, 3C–28
Central Europe, 3.3–214, 3.3–218
Central European rivers, 3.3–201
Chile, 3C–130, 3C–193
China Seas, 3.3–69
Colombo, Ceylon, 3.3–192
Cordillera Region, Argentina, 3C–144, 3C–253
Córdoba Province, Argentina, 3C–114, 3C–162, 3C–173, 3C–189, 3C–191, 3C–223, 3C–250
Cumberland, England, 3.3–146
Cuyo, Argentina, 3C–150
Czechoslovakia, 3.3–142, 3.3–159

Dolores, Argentina, 3C–222
Dorset, England, 3.3–188
Driffield, England, 3.3–162

East Africa, 3.3–179
Eastern United States, 3.3–120
Ecuador, 3.3–37
England, 3.3–146, 3.3–148, 3.3–162, 3.3–181
Euphrates, Iraq, 3.3–205
Europe, 3.3–98, 3.3–156, 3.3–236

Falkland Islands, 3C–229, 3C–232
Florida, 3.3–169
France, 3C–217

General Pico, Argentina, 3C–240
Germany, 3.3–6, 3.3–39, 3.3–40, 3.3–71, 3.3–145, 3.3–148
Gibraltar, 3.3–164
Gran Chaco, Paraguay, 3C–39
Great Britain, 3.3–8, 3.3–144
Greenland, 3.3–161

Habbaniya, Iraq, 3.3–87
Honduras, 3.3–77
Himalayas, 3.3–200

Imperial Valley, California, 3.3–259
India, 3.3–167, 3.3–186
Indian Ocean, 3.3–246

Indonesia, 3.3–215
Iowa, 3.3–41
Iraq, 3.3–87, 3.3–205

Japan, 3.3–109, 3.3–128, 3.3–213, 3.3–239
Jungfraujoch, Swiss Alps, 3.3–250

La Plata, Argentina, 3C–135
La Quiaca, Argentina, 3C–242
Lavayén River Valley, Argentina, 3C–248
Las Heras, Argentina, 3C–142
Leipzig, Germany, 3.3–233

Mecklenburg, Germany, 3.3–235
Mediterranean Sea, 3.3–246
Mediterranean Region, 3.3–64
Mei-tan, China, 3.3–251
Mexico, 3.3–222
Miltenberg, Germany, 3.3–245
Missouri River Basin, 3.3–202
Mojave Desert, California, 3.3–154
Montevideo, Uruguay, 3C–75, 3C–86, 3C–88, 3C–91, 3C–95, 3C–96, 3C–99 to 3C–101, 3C–103, 3C–105, 3C–112
Mount Washington, New Hampshire, 3.3–171
Munich, Germany, 3.3–71

Nagano, Japan, 3.3–128
Netherlands, 3.3–122, 3.3–193
New Hampshire, 3.3–171
New Mexico, 3.3–75, 3.3–76, 3.3–217
New York, 3.3–80, 3.3–252
Nigeria, 3.3–221
North America, 3.3–222
North Atlantic Ocean, 3.3–121
Northeast Atlantic, 3.3–148
Northern Hemisphere, 3.3–129
Northwest Argentina, 3C–164, 3C–221

Palestine, 3C–217
Pampa Region, Argentina, 3C–168
Paraguay, 3C–39, 3C–46 to 3C–73
Paraguayan Chaco, 3C–53
Patagonia, Argentina, 3C–141, 3C–144, 3C–194, 3C–232, 3C–239
Puerto Rico, 3.3–170
Punta del Este, Uruguay, 3C–103
Punto del Indio, Argentina, 3C–222

Rhodesia, 3.3–178
Río de la Plata Region, 3C–29 to 3C–31, 3C–37, 3C–38, 3C–43, 3C–44, 3C–218

Sahara Desert, 3.3–196, 3.3–209
Salta (Province), Argentina, 3C–249
San Jorge, Uruguay, 3C–83
San Luis, Argentina, 3C–176
San Miguel, Argentina, 3C–176
Schenectady, New York, 3.3–252
Schönbrunn, Paraguay, 3C–61
Scotch Bay, South Orkney Islands, 3C–212
Scotland, 3.3–203
Shannon Island, Greenland, 3.3–161
Sierra de Córdoba, Argentina, 3C–189
Sierra de Famatina, Argentina, 3C–224
Sierra Nevada, California, 3.3–204
Sinai, Egypt, 3.3–219
Slovakia, 3.3–195
South America, 3C–1 to 3C–5, 3C–7 to 3C–9, 3C–11 to 3C–28, 3C–33, 3C–34, 3C–40, 3C–45, 3C–167
South Atlantic, 3C–170
South China Sea, 3.3–246
South Orkney Islands, 3C–212, 3C–213
Southern Hemisphere, 3C–213
Southern South America, 3C–41
Southwest Africa, 3.3–189
State College, Pennsylvania, 3.3–247
Stuttgart, Germany, 3.3–71
Switzerland, 3.3–184
Syria, 3C–217

Tennessee, 3.3–187
Transjordan, 3C–217
Tropical Pacific, 3.3–115
Tucumán Province, Argentina, 3C–151, 3C–160, 3C–175, 3C–198, 3C–201, 3C–225, 3C–246
25 de Mayo, Argentina, 3C–204

U.S.S.R., 3.3–131, 3.3–208
United States, 3.3–210
Uruguay, 3C–35, 3C–36, 3C–42, 3C–74 to 3C–113
Uspallata, Argentina, 3C–177

Vienna, Austria, 3.3–214, 3.3–335, 3.3–336
Villa Rica, Paraguay, 3C–56

Washington, D. C., 3.3–68
West Africa, 3C–45
Western Australia, 3.3–81
Western Europe, 3.3–218
Western Pacific, 3.3–116
Western States, 3.3–74